

THE IRON AGE

New York, March 5, 1931

ESTABLISHED 1855

VOL. 127, No. 10

WHERE ARE THE NEW AND GROWING MARKETS?

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WHAT INDUSTRIES ARE
THE MOST PROMISING
FOR THE DEVELOP-
MENT OF STEEL AND
MACHINERY DE-
MANDS? ELECTRIC
REFRIGERATION IS
OUTSTANDING.

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DURING the past year of declining earnings, reduced dividends, deflation of security prices and generally poor business, the phrase "depression-proof" industries has come to have a significant meaning.

What are the "depression-proof" industries? What are the industries that are not only shock-proof in periods of business crisis, but that promise, despite obstacles, to make progress toward greater development?

The investing public and the purveyors of materials and equipment have alike been eager in their search for companies or lines of production or distribution that have come through the trials and tribulations of recent months not only with an unimpaired record, but preferably with one that showed progress and hope for the future.

The horizons have been scanned for new or growing industries that would emulate, even though in smaller measure, the rapid rise of the automobile industry in the past decade or more.

A Wide Search for New Markets

STEEL companies, machine tool makers and other material and equipment producers have been on a wide search for new markets for their products. It has been recognized that perhaps no new industry will spring up that can possibly rival the automobile industry in its consumption of the nation's energies and resources. It is perhaps more logical to expect that ten or a



ELECTRIC refrigeration industry has copied production methods of automobile industry. A scene along the assembly line at the Frigidaire plant near Dayton, Ohio. Meat cabinets (opposite page) cooled by electric refrigeration are in wide use in retail stores. Commercial sales in 1930 were 40 per cent of the total business as measured in dollar volume.

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dozen new or growing industries may furnish the new markets that are being sought.

One of these is electric refrigeration. From an output of 75,000 units in 1924, the industry grew to the production and sale of 1,000,000 units in 1930, and the 1931 schedules total 1,300,000 refrigerators.

Estimated to have consumed 150,000 tons of steel last year, this industry offers a potential market for 1,000,000 tons of steel a year, if its statement is correct that only 15 per cent of the refrigeration market has been touched.

A campaign is on for the sale of 1,000,000 household electric refrigerators this year. The commercial and industrial markets are still almost virgin territory. What is more, the cooling of our homes in summer by refrigerating units is not a visionary idea, and, although it may not actually come for years, the growth of refrigeration in theaters, hotels and office buildings suggests that it may be nearer than we think.

One large manufacturer has used steel cabinets since its refrigerator was first placed on the market. Others are increasing their use of steel. The manufacture of cooling units and the forming of metal cabinets has called for large purchases of machine tools, one company alone having recently bought about \$1,000,000 worth of such equipment.

Other Industries Offer Promise

THERE are other industries, some scarcely beyond the first development stage, that promise eventually to rival electric refrigeration in rapid strides, once they get a firm foothold. One of outstanding potentialities is the building of steel houses and other small structures. Another, closely related, is the fabrication of complete bathrooms and kitchens of steel, with standardized equipment, ready for assembly and installation. Television and talking picture machines for the home are actual accomplishments, though their commercial development, on a large scale, remains for the future. But in electric refrigeration is a ready-made industry, already of substantial proportions, with a promising outlook for large growth.





Electric Refrigeration a Rapidly Growing Industry

By BURNHAM FINNEY
Detroit Editor, The Iron Age

FEW industries making products listed generally as "necessities" weathered the 1930 business storm without feeling some ill effects. It is little short of amazing, therefore, to discover an industry, still perhaps in the luxury class, which showed a gain in sales last year of 10 per cent compared with 1929. Yet that is the achievement of manufacturers of electric refrigerators.

In fact, the almost overnight growth of electric refrigeration is one of the most intriguing business romances. Although the first unit was built about 1910, the industry languished for more than a decade, its progress having been interrupted during the war and in the years of reconstruction immediately following. It has been estimated that from 1910 to 1920 only 10,000 units were produced. In the next four years total output jumped to 75,000 units.

It was not until 1925, however, that the iron and steel mills, makers of castings, and machinery equipment companies began to recognize in electric refrigeration a market of no mean proportions. In that year the industry made more units than in the previous 14 years combined. Nineteen twenty-six brought a doubling of 1925 activities, and the succeeding years have registered tremendous gains, until in 1930, against the somber background of a business depres-

sion, the industry made and sold for the first time 1,000,000 refrigerators.

Goal for 1931 Is 1,300,000 Units

Electric refrigerating companies are not content to pause after such an accomplishment, for they already are pushing ahead their 1931 goal to a total of 1,300,000 units; and it is reasonable to expect that they will attain it. Despite the phenomenal strides of the last five years, they have scarcely tapped their market in the household, commercial and industrial fields.

Although industrial use of electric refrigeration is increasing swiftly, main effort of manufacturers has been concentrated on household installations, which now constitute about 75 per cent of total sales. It is figured that every wired home in the United States is a prospect. As there are more than 21,000,000 of these and perhaps 3,000,000 families now owning electric refrigerators, the industry has sold less than 15 per cent of its potential market.

It is so engrossed in putting its product into homes which never before have known anything but the daily visit of the ice man that it is paying practically no attention to replacements. At least this is the testimony of the sales manager of one of the largest



Refrigerating systems providing cool drinking water for workmen in industrial plants open up a vast market. Here is one unit of the system installed at the Geometric Stamping & Tool Co., Cleveland. Note the saving of floor space by placing the refrigerating equipment overhead.

makers. It has no trade-in problem and is not likely to have one for a number of years. To be sure, a few owners have turned in their old models as part payment on new units, but such arrangements are entirely the dealer's responsibility without help from the factory.

Commercial and Industrial Markets Scarcely Tapped

While household refrigeration has been the chief reliance of most companies, they also have been keenly alive to the commercial possibilities. Although only 25 per cent of the unit sales in 1930 were classed as commercial, they amounted in dollar volume to 40 per cent of the aggregate business done by the industry. This is explained by the fact that the average com-

mercial unit order is much larger than a household installation.

A survey of the commercial market reveals its breadth. Meat shops, groceries, delicatessens, soda fountains, restaurants, hotels, clubs are among the users. Beyond these already established outlets, however, lie other possibilities which may be developed in the near future. There are refrigerating units for frozen meats, which have been introduced in a limited number of retail stores. There are units to be built into trucks for the transportation of perishable foods. There is the refrigerating equipment for railroad cars now kept cold by ice on transcontinental journeys.

Turning for a moment from the commercial market, one finds an industrial market which is almost virgin soil. Most companies have been so busy with the household and commercial activities that they have had little time to devote to selling refrigerated water systems to industrial plants employing thousands of men. The comparatively few installations which have been made have already demonstrated their economy; the result is that the larger electric refrigeration makers now have industrial sales divisions to expand this lucrative side of their businesses.

Although not a matter of the immediate future, some executives envision the time when electric refrigeration, in its household applications, will not be confined to the kitchen. Entire rooms will be cooled in summer, much as theaters and other public buildings maintain a temperature of 70 deg. by means of large refrigerating systems.

Experiences of Automobile Industry Have Been Drawn Upon

In its management the electric refrigeration industry has drawn heavily upon the personnel and experience of the automobile industry. One of the leaders, Frigidaire, is an important subsidiary of General Motors; another is reputed to be backed financially by interests closely affiliated with the automobile world; a third has as its head the president of a prominent Michigan automobile company. It is not surprising, therefore, that the younger industry resembles the older in its merchandising methods and its manufacturing processes. Mass production on conveyor assembly lines was popular almost from the start.

Electric refrigeration is even more of a seasonal product than automobiles; consequently it has always been faced with the problem of maintaining an effective selling force through a prolonged lean winter period. It has become expedient, under the circumstances, to tie up sales whenever feasible with another seasonal product which is in demand during the fall and winter. General Motors has relied upon radio to accomplish this purpose, many Frigidaire dealers handling General Motors radios. Other electric refrigerator makers have encouraged dealers to take on radio accounts or oil boilers to tide them over the winter months. On the other hand, one of the larger manufacturers disapproves of this practice as a general rule, but grants the concession to representatives in some rural com-

munities and in the exceptionally cold Northwestern sections of the country.

Sales of electric refrigerators are by no means confined to dealers specializing in this particular commodity to the exclusion of other articles, for public utility companies, furniture houses and even drug stores now are soliciting business. The latter have come into the field since the introduction of low-priced, popular models; each store usually carries only one floor sample. However, experience is showing that this outlet is worth considerable cultivation on the part of the manufacturer.

In view of the fact that the domestic market has offered such a rich opportunity for increased sales, some electric refrigerator companies have preferred to devote only limited energy to foreign trade. This does not mean, however, that countries outside the United States are not good prospects. Last year perhaps, 5 or 6 per cent of the total business of the industry came from foreign users, as measured in number of units, with household installations making up about three-fourths of the aggregate volume, as in this country. The foreign sales were not evenly divided among the leading makers, as the percentage of the total orders for individual concerns ranged from 2 to 8 per cent. An important manufacturer is authority for the statement that most

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ELECTRIC refrigeration has "come into its own" in the past five years, providing an outlet for 150,000 tons of steel annually as well as a demand for other metals and machinery. Amidst the depression which befell its neighbors, last year it made and sold 1,000,000 units for the first time. Yet it has covered less than 15 per cent of its potential markets, which lie in three fields—household, commercial and industrial divisions. All-steel units are gaining rapidly in favor and soon may entirely replace wood

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foreign countries "have not yet become ice conscious, to say nothing about electric refrigeration."

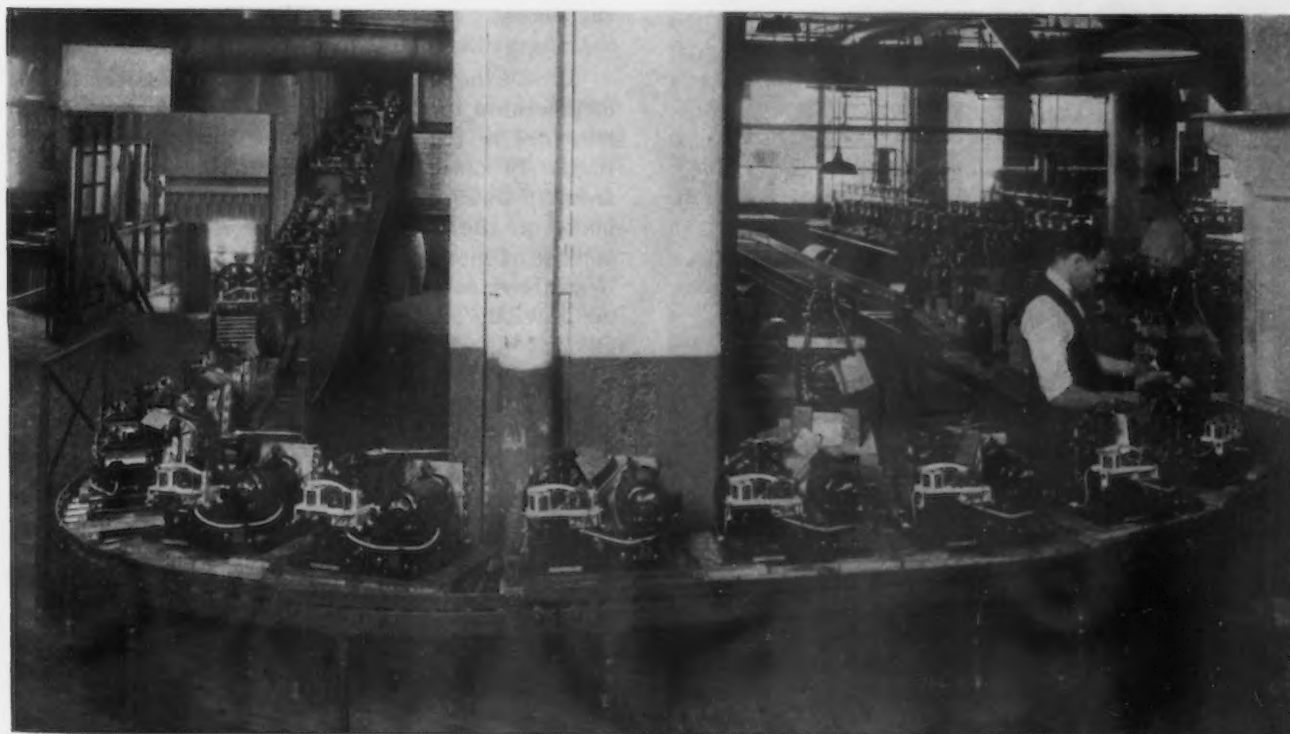
It is not surprising to find that 90 to 95 per cent of the industry's production has been concentrated in the hands of five or six companies. The meteoric growth of electric refrigeration in the last five years brought with it the usual consequences: an influx of manufacturers who had had no previous experience in refrigeration, but saw a golden chance to diversify their lines and attain high profits; an overexpansion of production facilities; the gradual weeding out of

the unfit, and survival of those possessing long experience, good management and adequate financial resources.

Cooperative Organization Formed to Expand Markets

Perhaps the industry was restrained from a more spectacular rise than actually occurred by the disinclination of manufacturers to support a trade association to help solve some of the problems facing individual companies and to push cooperatively a selling program. This, however, has recently been remedied by agreement among producers to work toward a common goal of expansion of markets. The newly organized Electric Refrigeration Bureau of

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Refrigerating units move along roller conveyor assembly lines at the Frigidaire plant.

State, City and Metal Trades Unite in Training Workers

TRAINING of foremen so that they will be better equipped for leadership, the teaching of apprentices on modern machine tools similar to those they will find in the shop when they leave school and encouragement of employees of metal-working companies to broaden their education through further study are the chief purposes of a cooperative program recently put into effect in Cincinnati by the combined efforts of the local branch of the National Metal Trades Association, the vocational education department of the Cincinnati public schools and the Ohio State department of vocational education, together with other Cincinnati educational institutions.



In this comprehensive program perhaps the most interesting development is the successful conduct of conference classes of foremen from Cincinnati's metal-working plants taught by important executives of the industry. Since 1927 R. W. Jenkins, supervisor of foremanship training for the Ohio State Board of Education, has been holding teachers' training or conference leadership meetings with representatives of Cincinnati's mechanical trades, some 25 executives having completed the work. Early last September plans for evening classes of foremen were made, with human engineering as the main topic of discussion.

Enrollment for classes was taken through educational advisers in the metal-working shops, with the result that a total of 267 men responded. Until recently it was difficult to organize classes to meet in the individual plants, as few factories had enough foremen to make the venture practicable. However, creation of a mechanical trades school under the direction of the vocational education department of the Cincinnati public schools provided a central meeting place.

Enrollment Exceeds Expectations

It was hoped that it would be possible to limit membership in the classes to 12 or 15 each, but the response to the call was so enthusiastic that eventually 10 classes were organized, ranging in size from 16 to 19 members. Assignment to classes was made on the basis of experience, two classes consisting of men who had participated to some extent in conference groups and eight of men who had had no previous experience. Five classes were to meet on Monday evenings and five on Wednesdays for a period of 10 weeks.

Enrollment was so large that 84 foremen were held over to be organized into classes beginning on Jan. 12. An analysis of 115 application cards filled out by foremen showed that the men ranged in age from 24 to 62 years, with an average of over 49 years. The largest number of men handled by a foreman attending the classes was 175.

Leaders of classes were selected from the group which had completed the work launched in 1927. After meeting for preliminary conferences with Mr. Jenkins and J. F. Arundel, director of vocational education of the Cincinnati public schools, the leaders applied for State vocational teaching certificates,

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TWO hundred and sixty-seven foremen in Cincinnati's metal-working plants have been attending conference classes sponsored jointly by the local branch of the National Metal Trades Association, the vocational education department of the Cincinnati public schools, and the Ohio State department of vocational education.

This is part of a comprehensive educational program, described in this article, which already has resulted in establishment of a mechanical trades school equipped with \$75,000 worth of machinery loaned by Cincinnati companies, and in appointment of educational advisers in every shop in the city to help office and shop employees select courses of study in Cincinnati's educational institutions from which they will derive the most benefit.

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which were granted. The list of teachers included men who could not possibly have been secured for this work without the influence of and cooperation of the industrial companies which they represented. The group consisted of J. A. Mitchell, employment manager, Cincinnati Bickford Tool Co.; Emory Frick, superintendent pattern shop, Worthington Pump & Machinery Corp.; R. L. Rickwood, works manager, Stuebing division, Yale & Towne Mfg. Co.; John Seegar, assistant general manager, Tool Steel Gear & Pinion Co.; Charles Otte, assistant superintendent, American Tool Works Co.; L. A. Yoder, manager Multi-V-Drive division, Worthington Pump & Machinery Corp.; John Herking, superintendent of apprentices, Cincinnati Bickford Tool Co.; Benjamin Mersch, shop superintendent, Cincinnati Shaper Co.; N. M. Nettleton, assistant superintendent, Tool Steel Gear & Pinion Co.; and R. T. Johnston, assistant superintendent, Lodge & Shipley Machine Tool Co. As substitute teachers the classes had George Seyler, works manager, Lunkenheimer Co.; Max B. Robinson, director of personnel, Cincinnati Milling Machine Co.; William E. Schneider, superintendent, Edna Brass Co.; and William Dolle, sales engineer, Lodge & Shipley company.

Program of Subjects Is Well Balanced

Mr. Arundel said of the foremen's courses, "I believe that this is one of the most significant move-

ments in education that any industry has ever supported." However, they might be termed the post-graduate course in a program of evening classes for the mechanical trades, which embraces mechanical drawing, strength of materials, machine design, shop mathematics, machine shop practice and pattern making. Enrollment in these courses was confined to employed men and women over 16 years of age who desired additional knowledge or training along the lines of their present occupation.

Each teacher conducted a class in a special subject. The topics for the 10 meetings making up the course were:

- Safety
- Waste Elimination
- Giving Orders and Directions
- The Foreman's Job
- Right Man on the Right Job
- Analysis of Yourself and Job
- Improving Men
- Maintaining Discipline
- Leadership
- Dealing with a New Man

Metal-Working Plants Provide School Equipment

In order that students may have the opportunity of learning how to operate modern machine tools and of increasing their knowledge of wood patterns, Cincinnati's metal-working plants have loaned to the Mechanical Trades School \$75,000 worth of machine tools and other machinery of the latest design.

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Saving Weight in Building Navy 10,000-Ton Cruisers

WHEN the Washington Conference on Limitation of Naval Armaments concluded its labors in 1922 it left the stipulation that cruisers should not exceed 10,000 tons displacement. There has been great effort on the part of the five leading naval powers to pack into such a limited size all of the military characteristics possible. Guns, machinery, armor, sea-keeping qualities, fuel endurance—these are but a few of the leading elements involved.

In a paper read last November before the Society of Naval Architects and Marine Engineers, Rear Admiral George H. Rock, chief constructor, U.S.N., told a good deal about how the designs of some of these vessels were worked out. Much of what follows is from his paper.

Saving in hull weight became the primary problem of design. On the other hand, the ship as a whole and in its various details must be strong enough for the work intended. In addition, the weights must be forecast with such accuracy that no overweight beyond the allowed displacement would result.

Welding Largely Employed

Welding was more generally called for and employed than in any previous class of ships built for the United States Navy. There was no general adoption of welding throughout the ship's structure as a whole, as it was felt that insufficient experience had been had to warrant placing full reliance on this method of joining plates, except in special instances. However, where local strength, rather than general structural strength, was involved, and for the attaching of fittings, welding was generally called for.

Throughout the first and second platform decks, forward and aft, the most extensive welding was specified. These decks are generally of 9 to 12-lb. plating (0.22 to 0.3 in. thick.) Throughout their extent this plating has been joined by full, continuous welding and con-

nected to the supporting beams by light, intermittent welds. Besides this, all seams and butts of the superstructure deck, upper platforms and deck houses are completely welded. Moreover, special welded brackets were specified for the stiffeners on all bulkheads.

A most extensive use of welding was in the water and oil pipes throughout the ship, in which the builders were required to use welding to the greatest possible extent. Practically all sections of pipe were connected by butt welding, while the usual cast fittings were replaced by fittings of welded construction. By this means flanges, bulkhead fittings and cast elbows and tees were eliminated almost entirely and the whole pipe system built up by means of welding.

Welding was used also throughout the whole ship for the attaching of fittings to decks and bulkheads, in the construction of hatches and hatch frames, and for the attaching of pads for door and hatch fittings. A requirement in the specifications stated that, in general, welding would be permitted on all foundations, stowages, clips, fittings, etc., throughout the ship, provided the final weight was equal or less, and strength equal or greater, compared with riveting of forgings or castings.

Light Material Extensively Used

For some time the Navy had been experimenting in the use of aluminum alloys on board ships. Early difficulties due to corrosion in sea air and under the influence of sea water had been serious. These, however, had been practically eliminated, and where local strength only was involved it was felt that they could be safely used.

Consequently, this material was adopted generally throughout the ship for such minor divisional bulkheads as living space, office partitions and staterooms. All furniture, such as built-in bunks, mess tables, desks, chiffoniers, lockers, etc., were built of aluminum alloy. All chairs for officers' cabins, staterooms,



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CUTTING weights without diminishing needed strength was done in many ways in building the new 10,000-ton cruisers. And experience with one ship led to extensions of the practice in the next. How this was done is told briefly here.

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mess rooms and offices were of the same material. Besides these interior items numerous fittings, such as air port frames, lens frames and blast covers of all air ports on and above the second deck were made of aluminum alloys. Ladder treads and the bed-plates of motors and auxiliaries were made of the same material, when not subject to shock. It was found necessary, in using these materials, to avoid intimate contact between them and such dissimilar materials as steel, brass, bronze or copper. Where such contact would have occurred insulating material was inserted between the faying surfaces of the two metals.

Other weight-saving devices outside of the metal end were adopted, including a teak deck only 2 in. thick, in place of the customary 4 in., and a sheathing

of 1 in. of cork inside the frames throughout the living spaces in place of the light metal sheathing customarily employed.

Saving in Weight of Paint

Aluminum paint was adopted generally as a priming coat throughout the ship, and as a finishing coat for storerooms and lower deck spaces. Compared with oil paint, this represented a considerable saving in weight.

As a result of all these precautions, some of which were developed after the ships were well under construction, the first two cruisers finished weigh approximately 650 tons less than the estimate in the original design.

Detinning Scrap by a New Process

A NEW process for detinning scrap tin plate is discussed by W. W. Scott and N. E. Davis in *Industrial Engineering Chemistry* for August. It is based on the fact that dilute solutions of tartaric acid dissolve tin in the presence of an excess of air or oxygen while the iron is unattacked.

The detinning apparatus used consists of a perforated steel cylinder which contains the tin plate scrap. The cylinder is turned on a steel shaft which passes through the length of the cylinder and detinning tank. In the detinning process the solution level is regulated to cover about one-third the cross-sectional area of the cylinder. The scrap is subjected to the alternate action of acid and air. Three hours is found to be the most efficient length of time to conduct detinning and the acid is most effective at 5 per cent concentration.

After detinning the solution contains stannous tartrate. The tin may be recovered from the solution

by precipitation as sulphide with hydrogen sulphide. The tin from the stannous tartrate is replaced by the hydrogen from the hydrogen sulphide and tartaric acid is recovered. There is a slight loss of tartaric acid in this reaction owing to decomposition, which is about 0.10 gram of acid per gram of tin recovered.

The tin sulphide may be converted into the chloride by treating with hydrochloric acid. The detinned scrap contains about 0.10 per cent of tin which is sufficiently low to render it suitable for steel melting scrap.

Various electrical developments, many of which pertain to the steel industry, are discussed in a recent booklet issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, entitled *Engineering Achievements During 1930*. The booklet, which contains 40 pages, is profusely illustrated and contains general rather than technical descriptions of the installations covered.

Perpetual Inventory Control Tied

By SIDNEY G. KOON

Associate Editor, The Iron Age

A PLANT which makes a more or less standardized product, and turns it out at a fairly uniform rate, month in and month out, may have many items in its parts inventory. Inasmuch, however, as its operations result in passing those parts through the assembly line at a fairly steady rate, in-

ventory control is simple. It need only see to it that there is at all times a sufficient quantity available to take care of manufacturing requirements over a certain period. This period is usually the time necessary to acquire a definite lot of the parts, through manufacture or purchase, with perhaps a margin to take care of possible delays.

Quite another problem is that which faces a plant making a great variety of things. And especially is this true when little, except some of the details, may have any semblance of standardization. In the business of an Eastern manufacturer of electrical equipment a great deal of specialization enters. Roughly, half of the output in dollar value is represented by special electrical devices of many descriptions, most of which are highly technical. The remainder of the output consists of small electric motors of varying characteristics, and also to a considerable extent along specialized lines.

A perpetual inventory method has been devised for control of both storeroom accumulations and disbursements and productive activities.

ASSEMBLY ORDER				DATE 11/26/30		ASSEMBLY ORDER NO. 46757-A			
PRODUCT 100 HRI-15, 1 HP, int. rep. AC motor, vent. combination coffee mill and meat chopper type, 110/220 volts, 60 cycle, 1750 RPM, single phase, waste packed bearing constr. no base, or pulleys, bring out 4 leads 11" long. Rotation clockwise facing comm. end. Constr. as per sales spec. 999-B. Do not stamp frame size on nameplates.				NO. OF SHEETS 2		PRODUCT NO.			
				SHEET NO. 1		CLASS			
				APPROVED BY		TYPE HRI			
CUSTOMER				SHIPPING ORDER NO. 46757-A		SIZE 15			
NO. OF PIECES THIS ORDER	NAME OF PART	PIECE NO.	✓	DRAWING NO	PRODUCTION OR REQ. ORDER NO.	QUAN DEL'D.	UNIT COST	UNIT	TOTAL COST
PARTS LIST # 16969-D									
100	Frame Rings	25150			76997	15			
100	Pins	15991		Reg. 6.					
100	Fr. Caps & Encl. Covers Complete	25157			76998	15			
100	Back Caps	25152			76999	15			
200	Bearings	55401			77297	14			
200	Bearing Ret. Screws	134	✓						
200	Upper Frame Screws	25155	✓						
200	Lower Frame Screws	25156	✓	2650					
200	Stator Ret. Screws	2496-Pa.	✓						
200	" " " Washers	780	✓						
100	Brush Rings & Holders Assembled	55840			77000	16			
200	Brushes - - 3/16x255	52479	✓	2651					
100	Brush Ring Clamps	51922	✓						
100	" " " Screws	561-Pa.	✓						
100	" " " Screws	2496-Pa.	✓						
100	Brush Ring Lower Clamp Washers	9494	✓	Reg. 6					
100	Oil Gauges - back	14150-11	✓						
100	" " - front	14551-11	✓						
100	" " Sipples - front	55150-11	✓						
400	Endplay Washers	5506	✓						
200	" " "	52276	✓						
100	Nameplates	52951	✓	2652					
100	Lead Ferrules marked F-1	11750							
100	" " " F-11	11751							
100	" " " S-1	11752							
100	" " " S-11	11753							
200	Bearing Encl. Covers	7975	✓						
100	HRI-15 wound Armatures as per Spec. # 6805-C	25161			77295	13A			
TOTAL WEIGHT OF WIRE RM: 269# of #15 D.C.						21			
SEE SHEET 2.									

FIG. 1—Assembly order for 100 motors, showing how items are checked against inventory cards, and parts orders issued against shortages.

in with Production Control

MORE and more is industry turning to precise methods of control—pressures, temperatures, timing of operations and handling orders and inventories.

About 16,000 cards on the live list carry the information contained within the perpetual inventory department of this plant. These are divided among several clerks, each of whom works from one receptacle or "tub," containing perhaps 4000 cards. Each clerk has a bookkeeping, calculating typewriter by means of which the entries are made on the cards. The machines add and subtract, according as material is put into stock or taken out.

Orders coming into the plant go through the engineering department, where the parts and assembly lists are made up. These assembly orders are mimeographed so that there are copies available for each department which is to work on the order, as well as record copies for the production control office and the engineering department. Such an order, calling for 100 1-hp. a.c. motors of stipulated characteristics, is shown, in part, in Fig. 1.

As soon as this order reaches the production control office, carrying as it does a list of the parts required, together with the number of each needed to fill the order, it is checked by order department for special material which is not stocked. Subsequent production orders are issued for these special items and the order is then sent to the inventory

control room. Here every item on the list becomes the basis for an examination of the corresponding inventory card, and determination as to whether the material is in stock or will have to be ordered.

Taking the case of Fig. 1, a check mark immediately at the right of the piece number indicates two

ASSEMBLY ORDER					DATE 11/26/30		ASSEMBLY ORDER NO. 500343		
PRODUCT <u>WANTED Jan. 1, 1931</u>					NO. OF SHEETS 1		PRODUCT NO.		
Items A and B C ———— see below					SHEET NO. 1		CLASS		
CUSTOMER <u>Holding Room - Strs. #8</u>					APPROVED BY		TYPE		
					SHIPPING ORDER NO. 500343		SIZE TIQ/VB		
NO. OF PIECES THIS ORDER	NAME OF PART	PIECE NO.	✓	DRAWING NO.	PRODUCTION OR REQ. ORDER NO.	QUAN. DEL'D	UNIT COST	UNIT	TOTAL COST
	Item A								
1000	1000- #16x120 Cords, plugs and buttons, 8 ft. single 3L41B - long collar		✓			x			
	Sets of parts as per list A-43-2 except less 6 ft. cords pce. #21662								
	ADD:-								
1000	8 ft. single cords	19950		77290					
1000	Long release sleeves	46550		73548					
	Dept. 25 assemble								
	Item B								
	100- Ditto. 15 ft. single 3L41B long collar.								
100	Sets of parts as per list A-43-3		✓			x			
100	Release sleeves - long	46550		73548					
	Dept. 25 assemble								
	Deliver to Strs. #8 in lots of 50 or multiples.								
	Item C								
	25- #16x120 Cords, plugs and buttons, 15 ft. double 3L41B. long collar								
25	Sets of parts as per list A-43-1		✓			x			
50	Releasing sleeves - long	46550		73548					
	Dept. 25 assemble								

FIG. 2—Assembly order for signaling cords, tying in with separate sub-assembly lists.

things. First, it states that a sufficient number of parts is in stock. Second, it indicates that the number called for by the order in question has been deducted from the available list on the perpetual inventory card (which will be explained later), thereby insuring that overdrafts on the supply will not be made.

the column so headed. If a still further quantity is required beyond that already on order, a further order, of course, must be placed.

It may be that the draft on the stock will reduce the quantity on hand to a point below the standard low limit (or danger line) shown on the face of the inventory card. In this case, again, an order is at once placed for the standard quantity which experience shows to be the most satisfactory amount to order at any one time.

A variant in this method of handling orders occurs when it happens that a standard set-up carrying a considerable number of parts enters into the requirements. Such a sub-assembly, so to speak, may be made all the same, or virtually so, for a number of different pieces of mechanism, whether motors or otherwise. In such a case, to avoid the necessity for a large amount of typing for parts which are likely to be repeated over and over again, special assembly parts lists and operation sheets have come into use. One of these is shown in Fig. 3, as called for under Item A, in the assembly order shown in Fig. 2.

At the upper right corner will be found the piece number. This is one item appearing on the assembly order (Fig. 2) prepared by the engineering department. On reaching the production control department, a copy of this sub-assembly

sheet, of which a supply is in the file, is taken out and the quantity of individual parts extended in accordance with the number of such sub-assemblies required. This sheet then becomes a part of the assembly order, and is passed through the inventory control cards in exactly the same manner. The parts called for are deducted from the parts available in storerooms, new orders are written for such parts

DATE OF LIST 10/22/28		ASSEMBLY PARTS LIST AND OPERATION SHEET		DATE OF ORDER		PIECE NO. 4-45-2		
1000		PRODUCT Cat.# Single 6 foot 4 conductor Tires Cord complete with plugs and buttons (5 lights and 1 buzzer)		NO. OF SHEETS 1		PRODUCT NO. PL-7852-T		
CUSTOMER				SHEET NO. 1		CLASS		
				APPROVED BY		TYPE		
				SHIPPING ORDER NO. 500343		SIZE		
MAT. SYM.	QUANTITY	NAME OF PART	PIECE NO.	PROD. OR REQ. ORDER NO.	QUAN. DEL'D.	UNIT COST	UNIT	TOTAL COST
A	1	1000 Shell	72755	✓				
B	1	1000 Mounting Block	46424	✓				
C	1	1000 Locking Spring	72915	✓				
D	4	4000 Screws, Brass	10732	✓				
E	3	3000 Contact Springs	15900	✓				
F	1	1000 Contact Spring	15901	✓				
G	2	2000 Contact Spring Guard	15909	✓				
H	1	1000 Common Spring Guard	72579	✓				
J	1	1000 Buzzer Spring Guard	71407	✓				
K	3	3000 Screws, Br. low flat Hd. 5/32 x 6-32	13061	✓				
L	1	1000 Screw, Br. low flat Hd. 5/32 x 6-32	13061-WM	✓				
M	1	1000 Plunger Spring	15896	✓				
N	1	1000 Plunger Assembled	46576	✓				
O	1	1000 Stop Spring	72916	✓				
P	1	1000 Brass Screw	11066-WM	✓				
Q	3	3000 Brass Screws	11066	✓				
R	2	2000 Screws, Brass	10919-WM	✓				
S	1	1000 Guide Rod	72904	✓	75995			
T	1	1000 Spring	72917	✓				
U	1	1000 Receptacle	30166	✓	75994			
V	3	3000 Contact Plugs	70555	✓				
W	1	1000 Contact Plug	70555-WM	✓				
X	4	4000 Washers, Brass	11118	✓				
Y	1	1000 6 Ft. Tires Cord	21611	✓				
Z	1	1000 Tag Form #1058	72249	✓				
AA		Boxes (See note below)	21611	✓	2648			
OPERATIONS								
A	Dept. 25	Assemble mounting block						
		Inspect						
B		Assemble complete and pack (See note below)						
		Inspect						
		NOTE: When making up for stock, pack 10 in Box #21611						
		Del. to Strs. #2						

FIG. 3—Sub-assembly or assembly parts list, amplifying the data of Fig. 2 and simplifying the procedure of passing orders through the system.

Where there is a shortage in the part required, that fact is designated by the letter S in the checking column, whereupon the necessary orders are at once placed for replenishment of the supply of those parts which may be short.

A still further condition may exist in that an order to replenish this supply may be already outstanding. This produces the requisition number in

Signals.				PC. NO.	B/P NO.	DATE	75412	
2500 Shells for Hospital Push Buttons				✓		8-22-30 ISSUED BY FWK/sob PATTERN NO.		
				72755	E-72755			
FROM	TO	MATERIAL	✓	PROD. OR REQ. NO.	QUAN. DEL'D.	UNIT COST	MATERIAL COST	APPLICATION
56	57	2500 Moulded Shells B/p E-72755		62747				
TOTAL MATERIAL COST								
DEPT.				COMPL.	REC'D	DUE	RELEASED	
SCHED. DATE								
START								
STARTER								
INSPECT							75412	
DEPT.				OPERATIONS	PIECE RATE	MACHINES AND TOOLS		
57				Receive & inspect.				
16				Drill & C'sink Inspect.	Pe.R.			
				Deliver to Stores #6				

as need replenishment and check is made as to whether the supply available is getting into dangerous waters.

Taking Care of Contingencies

Experience over a long period of years has shown the company about what percentage must be added to each order for special parts, to make sure that the total number required will be on hand when needed. An example of this is shown in Fig. 4, wherein an order is placed for the cast iron frame castings for the motors covered in Fig. 1. The first item in that list on Fig. 1 is 100 frame rings, which are non-standard, and are not carried in stock, and the production order is No. 76997. Fig. 4 is this production order itself.

It will be seen that 103 castings are ordered to be delivered from stores A to department X for processing. The extra three castings are in keeping with the company's experience that about 3 per cent of this particular type of part may become damaged in the manufacture of the

motor. Of course, if less than three parts are damaged there will be a small surplus. On the other hand, if more than three parts are damaged, an additional order will have to be placed.

Instructions at the bottom for the use of departments X and Y take care of whatever machining or other operations these particular parts should have, and designate where the parts will ultimately be delivered, prior to their final assembly into the motors.

Of course, these orders for processing take two forms. One of them has to do with the purchase of parts from the outside, with subse-

FIG. 5—Requisition covering an outside purchase (at left).

FIG. 4—(Below) Requisition for the frame rings—first item in Fig. 1—with instructions to two departments covering machining operations.

Motors				PC NO.	B/P NO.	DATE	76997	
100 HRI-13 Frame Rings						11-28-30 ISSUED BY FWK/sob PATTERN NO.		
				25150	C-27405	46757-A		
FROM	TO	MATERIAL	✓	PROD. OR REQ. NO.	QUAN. DEL'D.	UNIT COST	MATERIAL COST	APPLICATION
A	X	100 G.I. Frame Castgs. Patt. 9547						
TOTAL MATERIAL COST								
DEPT.				COMPL.	REC'D	DUE	RELEASED	
SCHED. DATE								
START								
STARTER								
INSPECT							76997	
DEPT.				OPERATIONS	PIECE RATE	MACHINES AND TOOLS		
X				Pickle and drag Wire brush DO NOT GRIND FOR FINISH Inspect DO NOT JAPANESE				
Y				Bore for stator and finish one cap seat Finish other cap seat Mill base Drill & tap—Inspect Del. to Stores B				
						Drill #2, #25, 50 Tap 3-32, 1/8"-16		

Signals.				PC. NO.	S/P NO.	DATE	75995	
6000 Guide Rods for Push Buttons				72904	B-72904	10-24-30 ISSUED BY PWA/ACB		
FROM	TO	MATERIAL	✓	PROD. OR REQ. NO.	QUAN. DEL'D.	UNIT COST	MATERIAL COST	APPLICATION
1	14	19# of #15 (.095) Brass Rod.	✓					
Inspect Material								
TOTAL MATERIAL COST								
DEPT.				COMPL.		REC'D	DUE	RELEASED
SCHED. DATE								
START								
INSPECT								75995
DEPT.				OPERATIONS		PIECE RATE	MACHINES AND TOOLS	
14				Gauge stop Thread Chamfer Cut off				
15				Wash Inspect				
12				Bright dip.				
Deliver to Stores #6								

FIG. 6—Requisition for manufacturing parts from raw material in stock.

quent processing of the part in the plant. The other has to do with processing of a part from raw stock already in the plant or otherwise ordered. Samples of these two cases are shown in Figs. 5 and 6. Along with Fig. 5 comes Fig. 7, a carbon of the original order for certain parts, which carries near the upper right corner a record of the receipt of these parts in several shipments. These receipts are taken care of, each by its own tag or receiving slip, and the date is shown.

Thus by proper routing of these various assembly orders it becomes possible to keep in touch at all times with the progress of each order, and to be able to inform the customer about when the shipment can be made. The scheduled dates of starting operation on any piece and of passing it on to the next department are provided for in the central part of Figs. 5 and 6. This does not happen to be filled in this case, but that is where the chaser has his guide in following material through the shop.

Double-Faced Inventory Cards

As this method has been worked out, the heart of the entire system is the inventory card. This is of cardboard, measuring about 12 x 13 in., and is worked from both sides. On the face, which is shown in

Fig. 8, a record in the upper half shows all orders for parts, and the state of completion thereof. In the lower portion of this side of the card is shown the application of the parts and various orders for work in process through the plant.

On the reverse, this card is divided into two parts, left and right. The left part shows the physical condition of the bin or shelf in the stockroom in which those parts are kept. Additions are made when new parts are received and deductions when parts are actually withdrawn to go into production. On the right side the record shows how much material is available, after taking care of all known demands not yet physically satisfied.

Raw stock in the shape of sheet steel or brass, rods or bars of either metal, and other material which is to be cut up for use is carried on the cards in convenient measures. Sheets and rods and some other things are in pounds. So is wire, both insulated and un-insulated. Square feet or linear yards fit other things.

This being the case, all entries on the cards, whether of receipt or withdrawal, are made in the standard quantity measure in use for the particular item. This explains why, in Fig. 6, production

order 75995 calls for 19 lb. of brass rod, of specified size, to make 6000 guide rods for push buttons. Experience has shown that the quantity called for will make the order, with perhaps a small margin for contingencies.

Movement of such an assembly parts list itself (Fig. 2) is simple. The original and one white car-

#62747	
546 - 22995 - 9/17	
488 842 - 22275 - 9/26	
987 - 22074 - 10/5	
547 - 22274 - 10/9	
August 22, 1930	
SPEC. INS. MFG. COMPANY NEW YORK	
125 Amory St. PP	
PO#75412 (16)	
2500 Push Button Shells, Bp-E-72755	72755
DUPLICATE OF ORIGINAL ORDER	
DUPLICATE	

FIG. 7—Company record of the outside purchase order of Fig. 5.

Inv. Card No. 6-3434	Wt./Unit	INVENTORY CARD STORE NO. 6				Pcs./Lb.	Piece No. 72915				
Unit ea	Lbs./In.	Description Springs				Pcs./In.	Drawing No.				
Low Limit (Available) 2500	Lbs./Ft.					Lbs./Sq. Ft.	Pattern No.				
Standard Quantity 10,000	Ins./Lb.					Lbs./Cu. Ft.	LOCATION				
Standard Factory Cost	Ft./Lb.	Used for Product Mounting Blocks assem. for locking and resetting button.				Card 1	RACK SECTION SHELF 10,000				
ORDERED											
OLD BALANCE	DATE	ORDER NO.	QUAN. RECEIVED	QUAN. ORDERED	BALANCE DUE	OLD BALANCE	DATE	ORDER NO.	QUAN. RECEIVED	QUAN. ORDERED	BALANCE DUE
750	Dec 25	85254		750	750		Dec 9	80621	3,978		281
750	Feb 1	85254		750	750	10,000	Dec 29	83747		10,000	10,000
652	Feb 1	85254	750		00		Dec 29	83747			
	Feb 9	85254	98		652	7,042	Dec 29	83747	2,958		7,042
	Feb 10	85254	850		198	1,875	Dec 29	83747	5,167		1,875
10,000	Oct 5	80621		10,000	10,000		Dec 29	83747	1,875	10,000	10,000
9600	Nov 19	80621	400		9,600		Dec 29	83747			
9198	Nov 21	80621	402		9,198		Dec 29	83747			
7209	Nov 26	80621	1,989		7,209		Dec 29	83747			
6349	Dec 8	80621	860		6,349		Dec 29	83747			
3697	Dec 8	80621	2,652		3,697		Dec 29	83747			
APPLIED ON ORDERS											
OLD BALANCE	DATE	ORDER NO.	QUAN. DELIVERED	QUAN. APPLIED	BALANCE APPLIED	OLD BALANCE	DATE	ORDER NO.	QUAN. DELIVERED	QUAN. APPLIED	BALANCE APPLIED
500	Dec 30	85251		500	500	79	Dec 16	420873		79	79
402	Feb 9	85251	98		402		Dec 20	84649	620		00
	Feb 10	85251	402		00		Dec 20	85032	250		00
100	Oct 7	80670		100	100		Dec 20	420873	79		00
250	Oct 7	80671		250	250		Apr 2	84776	100		00
300	Oct 8	80648		300	300	3000	Apr 13	86687		3000	3000
2000	Oct 8	80649		2000	2000	2000	Apr 26	87173		2000	2000
2000	Oct 24	80998		2000	2000	100	May 1	87352		100	100
1545	Nov 17	80649	455		1545		May 2	86687	3000		00
2000	Nov 23	81794		2000	2000		May 7	87352	100		00
743	Nov 21	80649	802		743		Jun 6	88313		2000	2000
	Nov 28	80649	743		00		Jun 11	88654		250	250
852	Dec 1	80998	1,148		852	250	Jun 14	87173	2000		00
	Dec 1	80670	100		00	400	Jun 26	88659		400	400
	Dec 8	80998	852		00		Jun 26	88654			
	Dec 9	80671	250		00						
	Dec 9	80648	300		00						
2000	Dec 23	83612		2000	2000		Jul 6	89248	250		00
250	Dec 31	83694		250	250		Jul 5	88659	400		2000
	Jan 11	81894	2,000		00						00
2000	Oct 28	84649		2000	2000						
	Jan 26	83612	2,000		00						
	Feb 5	85032	250		00						
100	Feb 7	84776		100	100						
250	Feb 13	85032		250	250						
620	Feb 27	84649	1,380		620						

FIG. 8—Face of a perpetual inventory card, showing status of orders for the parts, standard ordering quantity, and application of quantities to work in process.

bon copy go to the schedule man on the sixth floor. Another white copy and one on salmon paper go to the storeroom from which the material is to be delivered. The storekeeper retains the salmon copy as his record and, when delivering the parts to the manufacturing department, sends his white copy to the inventory control. The original, meantime, has gone from schedule man to storeroom, and thence, along with the parts, to the manufacturing department.

Meantime, before these copies are sent to schedule man and storekeeper, the items called for have been posted on the perpetual inventory card (right side of Fig. 9) as no longer available for future orders. In the language of international gold movements, they are "earmarked." When the white copy comes back from the storekeeper, the materials delivered to manufacturing department are charged off the card (left side of Fig. 9), and, so far as parts inventory is concerned, they no longer exist.

How this works out may be seen by tracing an item or two on Fig. 9. Near the bottom, at right, there were 7017 pieces "available" after posting 12 pieces on April 12. At left, same date, there were 7017 pieces "on hand" in stockroom, for the 12 pieces were physically removed from stockroom on that date. No assembly orders were outstanding, calling for more pieces; otherwise the "available" and "on hand" would not agree.

On April 13, 3000 pieces were posted under "available," reducing the available balance by that amount. But these 3000 pieces were not physically withdrawn from stockroom until May 2, and hence the stockroom record showed the larger number on hand until that date. Similarly, 2000 posted under "available" on April 26 were not physically withdrawn from stockroom until June 14, nearly two months later. Order numbers, in each case, serve to identify these transactions.

And the condition of stock is always shown com-

ON HAND						AVAILABLE						
OLD BALANCE	DATE	ORDER NO.	QUAN. DELIVERED	UNIT COST	QUAN. REC'D	BALANCE ON HAND	OLD BALANCE	DATE	ORDER NO.	QUAN. APPLIED	QUAN. RECEIVED	BALANCE AVAIL.
			Brought Forward						Brought Forward			
					98	98	00			500		500
98			58	155	850	00	500				98	598
00						850	402				850	448
350			402			448	448			06		442
448			06			442	442			250		192
											100	92
442			402			130	92			300		208
13					13	00	208			2000		2208
00					400	400	4208				13	4195
400				2.00	102	802	4195			2000		6195
502			002			00	6195				400	5795
00				2.00	1858	1858	5795				402	5393
1959			743			1244	5393				1989	3404
1244			1,143			98	3404				02	3306
90			100			02	3402				860	2542
02					02	00	2542				2652	110
							110				3978	4688
00					560	560	4688			2000		2688
560					2552	2552	2688			250		1838
3512			552			2660	1838			350		1488
2660				2.00	3878	6628	1488			42		1446
6628			250			6378	1466			10		1456
6378			500			6088	1436			37		1399
6088			350			4738	1399			2000		601
7738			42			7696	601			21		582
6696			2000			5696	622			70		592
5696			10			5686	692			100		792
5686			37			5649	792			250		1042
5649			61			5628	1042			10		1052
5628			2000			1628	1052				82	970
1628			70			1558	970			79		1049
1558			250			1308	1049				2958	1909
1308			18			1290	1909			37		1872
1290			1300			00	1872			10		1862
00					82	00	1862				5167	7029
00				2.00	8055	4055	7029			12		7017
2955			603			4118	7017			3000		4017
4118			250			4068	4017			2000		2017
4068			37			4031	4017			65		2014
4031			79			1572	2014			100		1914
1572			189			1383	1914			2000		86
1383			10			1373	86			250		336
1373				2.00	5167	1049	336			400		736
7029			12			7017	736			2000		2736
7017			65			7014						
7014			3000			4014						
4014			100			3914						
3914			2000			1914						
1914			250			1664						
1664			400			1264						

FIG. 9—Reverse of perpetual inventory card, showing at left the physical condition of storeroom stock and at right the stock record after allocating all outstanding requirements. In this case there is at right an overdraft of "earmarked" pieces, though the storeroom still has a supply.

pletely by the card. The last item under "available" on Fig. 9 shows an overdraft (OD) which aggregates 2736. And there are 1264 pieces "on hand" in stockroom. The total of 4000 is represented by the two posted assembly orders for 2000 each, June 6 and July 6, which have not yet reached stockroom. All other assembly orders have been cleared.

Turning now to other side of card (Fig. 8), we find that 10,000 pieces were ordered on May 2. These have not yet been received, or they would appear under *both* headings in Fig. 9, just as the item of 5167 pieces, received April 10, so appears. Thus enough new parts are coming along to take care of outstanding orders and considerable to spare, awaiting the next inflow of customers' requirements.


All of this tends to show how flexible such a system can be made, and yet, at the same time, how closely control may be maintained upon the whole

operation. There are frequent checks upon the card balances—verifications at irregular intervals, but usually three times a year, serving to keep physical inventory in touch with the records.

A different kind of flexibility is afforded by the way Fig. 2 and Fig. 3 work together. It will be noted that, at the top of Fig. 2, the order for 1000 sets of parts as per list A-43-2 says "except less 6-ft. cords, piece No. 21662." Cords of that piece number appear near the bottom of the standard list on Fig. 3. But a line is drawn through the item, to give effect to the "except less, etc."

To replace this item we have, on Fig. 2, the added item "1000 8-ft. single cords, piece No. 19950." Not being in stock, this lot has to be ordered, which is done under production order No. 77290. Similarly other items in such a list as A-43-2 might be replaced

(Continued on page 841)



How to Make the Most of Iron Ores

CONTINUING a conference which was begun some months ago in Chicago, a group of iron ore operating men and blast furnace operators, together with consulting engineers and professors interested in this topic, met on Feb. 17 in the Engineering Societies Building, New York, to discuss problems of iron ore beneficiation and kindred topics. This was in connection with the annual meeting of the American Institute of Mining and Metallurgical Engineers.

While the discussion at this round-table meeting was mainly informal, it was begun by a paper by Clyde E. Williams, associate director, Battelle Memorial Institute, Columbus, Ohio.

Lake Ores Good for Many Years

PPOINTING out that many estimates as to the probable future life of the supply of merchandisable iron ore in the Lake Superior region have ranged between 20 and 30 years, Mr. Williams expressed the view that good ore will be obtained from that source for many decades beyond that estimate. Those who have made the estimate look for a large increase in our imports of iron ores, the agglomeration of lean domestic ores from other sources and a great growth in the use of ores from the Southern fields of the United States, if given better freight rates for either the ores, or the pig iron or finished materials made from them. Some of these estimators have envisioned a concentration of the steel-making plants along the Atlantic seaboard to take advantage of the low attendant water freight rates on ores, and avoiding the costly haulage of such low-grade materials into the interior.

Mr. Williams sees, on the contrary, an accelerating growth in the establishment of steel plants along the shores of the Great Lakes, taking advantage of the proximity of these areas to the Lake ore region and

of the magnificent facilities in that region for handling ore, both at the head of the Lakes and at the points along the lower Lakes where the ores are unloaded and utilized.

Beneficiation of Lake ores is already increasing, though slowly. This should develop quantitatively and progressively as better processes are developed. Two or three of the present processes now in use were discussed in some detail and an analysis was made as to their characteristics and possibilities.

Should Recover More of the Ore

Improvement in methods of washing ore of the western Mesabi range will, Mr. Williams believes, permit the recovery of nearly all of the ore now lost in the process. This would result in getting back from the tailings possibly 1,000,000 tons annually.

With regard to the oxidized but largely unleached magnetic iron formations, a large recovery of concentrates will require extra fine grinding. At present much of this material is crushed so that it will pass through 150 mesh.

Production of sponge iron concentrated magnetically, and with the concentrate then briquetted, was then discussed as a portion of the charge for the blast furnace. This can be used also in open-hearth furnaces, but in some cases it is believed to hold too much sulphur taken up from the reducing fuels for use in the open-hearth process; and charcoal is too dear a fuel to be substituted in efforts to avoid this sulphur.

Cost Is a Deterring Factor

Sintering has replaced nodulizing in most plants. The speaker mentioned two sintering plants in use on the range and another in Pennsylvania, but doubted the present commercial applicability of this process for more than a small proportion of the ore going into furnaces, as the cost is \$1 or more a ton. He believes

that we must agglomerate the fines or use a larger percentage of fines in our blast furnace practice.

Present methods of taxation were stated to encourage a rapid depletion of rich ores, leaving for the future, through the exhaustion of these ores, the necessity to use the leaner material requiring special treatment, or excessive reducing cost in the blast furnace.

Discussion of Beneficiation Problems

SINTER, when properly made, can be dumped into cars, dumped from the cars into the ore pockets at the head of the Lakes, dumped from the pockets into the holds of Lake steamers, grabbed out of those holds by unloaders and dumped into piles on the docks of the lower Lake ports with a loss of only about $\frac{3}{4}$ per cent of fines small enough to go through 100 mesh, according to a statement made by Perry G. Harrison, Leventon, Minn.

As much as 30 to 35 per cent of this sinter would remain on a 1-in. mesh and is therefore a suitable blast furnace charge. According to this speaker, one of the principal advantages of sinter lies in the fact that it forms an open burden in the blast furnace, through which the gases of combustion from the burning coke can pass readily, thus promoting reducing of the burden. This is in contrast with the fine iron ore, which tends to mass itself together and block up the furnace, whereas the sinter acts more like the lumpy ore from the old ranges.

This sinter is produced by the speaker with a Dwight-Lloyd machine on which an 18-in. bed of material is run, because the material is open enough so that it can be sintered through such a thickness. Streams of coke braize are mixed with the ore in making up this bed. The sinter resulting is nearly a magnetite, or ferro-silicate. In practice it is found necessary to add water just ahead of the pug mill, if the material is to ignite readily.

Briquettes as a Furnace Charge

Briquetting was discussed by Rowland Cox, mining engineer, with regard particularly to magnetite containing $33\frac{1}{2}$ per cent Fe in the ore. This was ground so that 90 per cent would pass a 200 mesh, principally for the purpose of getting rid of the phosphorus, which was 0.08 per cent in the original ore. This was washed out by a water treatment until it was only 0.006 per cent in the final material. The ore was then concentrated to 62 to 69 per cent of Fe.

Material having 68 or 69 per cent Fe was associated with 0.01 per cent P, whereas material of 62 to 63 Fe had a little higher phosphorus, but not over 0.02 per cent. Finished briquettes made in this manner were $99\frac{1}{2}$ per cent hematite. They were made to a standard size similar to that of a building brick, being 2 by 4 by 8 in. Some furnace men claimed that these were too large, but they speeded up the furnace operation and smoothed it. Experiments have been made with pillow-shaped briquettes about 2 in. thick and smaller than the bricks, but the costs on a commercial basis are unknown. One of the main objections to the brick-shaped briquette was the cost of production, and this cost was largely that involved in piling the somewhat plastic material on the kiln cars.



THE life of merchandisable Lake iron ore, variously estimated at from 20 to 30 years, will be prolonged for many decades through improved methods of beneficiation, according to opinions expressed at a round table meeting of the American Institute of Mining and Metallurgical Engineers, held at New York, Feb. 17. Sintering is generally preferred to briquetting or nodulizing, mainly on the score of cost. Present practice, it is believed, will be much improved as more experience is gained. Recovery of the large tonnages of fines is also receiving increasing consideration.



Ten years ago at Moose Mountain the total cost of making these briquettes was \$1.37 a ton. Today a cost of \$1 probably could be bettered.

Costs Favor Sintering

This speaker believes briquettes are better than sinter as a furnace charge; but, because of the difference in cost, he would make sinter instead of briquettes if again he were engaged in concentrating this material. Mathesius showed some years ago that the reducibility of pressed briquettes is much greater than that of any sinter or nodules, or commercial ores. The briquettes are so porous that they will absorb 30 per cent of their volume of water. Making them takes about 5 per cent by weight of fuel—the same as making sinter. If properly burned, at about 1800 deg. Fahr., they may be weathered for years without disintegrating or breaking up in any way.

Regarding nodulizing, the speaker does not recommend this process. The nodules, he said, are turned into an iron silicate and it is difficult, if not impossible, to get gas through them. They seem to be just like billiard balls. They are made up by rolling the material, and gather mass somewhat like the proverbial snowball. They pick up pasty material in the process and make a mass which gas cannot readily penetrate.

Aspects of Ore Dressing

WE cannot afford to do with iron ore, worth \$2 a ton at the mines, what we can do with copper or other ores of very much greater value, according to Theodore B. Counselman, Chicago. If we are to make a profit on dressing ore, we would have to do upon it as simple an operation as is possible. To this end, it will be necessary in certain processes to throw away the tailings, even though there may be quite a bit of iron in them.

In one case, when treating material with 26 per cent iron, it was found desirable to throw away tail-

ings containing as much as 11 per cent of iron. That 11 per cent material could not be crushed and concentrated at a cost which would get the money back out of it. It follows that we must take out what we can get out cheaply.

Where the Sintering Should Be Done

This speaker suggests shipping the concentration fines to the furnaces for sintering there. He pointed to the presence at the furnace of plenty of coke braize, also an excess of blast-furnace gas suitable for igniting the charge. For this reason he believes that the work can be done better at the furnace than at the mine. A further advantage would be the possibility of mixing some of this fine material with the flue dust present at the furnace and thereby opening up the sinter bed.

Commenting upon this point, Mr. Harrison said there were countervailing obstacles which would make this plant practice not feasible. The question of royalty and excess freight charges would probably make it impossible to do the job cheaper at the blast furnace.

Segregation of the fines is a step in the right direction, according to T. L. Joseph of the United States Bureau of Mines. Fines should be handled separately and not mixed back in with the coarser concentrates. A satisfactory method of saving the fines, Mr. Counselman states, would be equivalent to the discovery of 1,000,000 tons of good washed ore every season.

How Bethlehem Does It

Two speakers from the Bethlehem Steel Corp. told of sintering Cornwall iron containing, originally, about 40 per cent Fe, 2 per cent Si and 0.4 per cent Cu. This is made into a concentrate with 50 per cent Fe and the slime then washed out to get a final 57 or 58 per cent Fe, with tailings having as much as 25 per cent Cu. A new method is being developed, with finer grinding, the object being to get greater concentration of both Cu and Fe, the latter running as high as 64 per cent.

Nodulizing the material in the furnace at Lebanon was abandoned in favor of sintering, because of the lesser cost of the latter. But the furnace operates better with the nodulized material. The company is still nodulizing Mayari ore in Cuba, and is getting with it a very satisfactory blast furnace operation. In sintering, the drop in sulphur content between the feed material and the finished sinter depends upon the proper amount of carbon. Practice has shown it possible to get the sulphur down from 1.25 per cent to 0.08 per cent, or less.

Adjusting Practice to Conditions

Whether prepared ore designed for opening up blast furnace burden will increase the proportion of flue dust made by the furnace was a point brought up by Ralph Sweetser. In some cases this probably will be so, but the speaker believes there will not be enough of a change in this direction to make it necessary to change the practice to meet this condition.

Blast furnace practice had to be adjusted to the use of Mesabi ore and now it will be necessary to adjust the practice further to such new conditions as con-

front us, with our leaner ores and the necessity for concentrating them. There are many problems to be met in this connection, now as then. Blast furnace men must work out the problems incident to beneficiation of their ores, beneficiation of their coking coals, and beneficiation of their fluxing stones. They will not be content to stop at an iron output around 1000 tons a day.

Sizing of Materials

Blast furnace practice, in the opinion of Mr. Joseph, must pay more attention to the physical characteristics of the materials, if we are to continue to make pig iron at today's costs. Sizing of material is not now wholly feasible, because there is so much in the way of fines which has to go in the charge. But if half of the material is sintered to a minimum of $\frac{1}{2}$ in. in size, it will be possible to size grade the material as a whole.

Sizing of blast furnace limestone was brought up by one speaker, who said that some furnacemen demand material which will pass over a $1\frac{1}{2}$ -in. screen and through a 4-in. screen. Others demand material between $1\frac{1}{2}$ and 5 in. At present the minimum size demanded will pass over a $1\frac{1}{2}$ -in. screen.

Suggests Advance in Present Methods

Ore dressing consists primarily in making a physical separation between the mineral and the gangue, according to William H. Coghill, United States Bureau of Mines. This gangue may be any one of a number of deleterious elements, but the most common is silicon. The speaker advocated using the present methods and improving upon them as we go along, rather than attempting to develop a wholly new method from the ground up.

He suggests, with regard to a previous speaker's experience, that the 11 per cent of Fe discarded in tailing might have been reduced considerably in the original process, even though there might be no commercially feasible method of treating that 11 per cent material and getting a worthwhile result at a workable cost. This is in line with his recommendation of improving the working processes as we go along, and making them give us a higher rate in their day-by-day operation.

Each iron ore from each part of the world is a problem by itself for the blast furnace man to solve, said William H. Smith of the University of Detroit. With regard to the matter of sulphur content, this speaker states that the best way to take it out lies in not putting it in.



Continuous Type of Pair and Sheet Furnaces Increases Output

By A. L. HOLLINGER

SINCE the World War three changes in sheet rolling mill equipment and practice, all of a more or less revolutionary nature, have been made. These include the normalizing furnace for production of steel sheets with extra deep drawing qualities; the continuous rolling mill, the use of which is limited to a few licensees; and the continuous pair and sheet furnaces, which practically double the output of the standard sheet mill.

The first and the last of these developments were the outgrowth of years of experimental work on the part of the research division of the Surface Combustion Co., Toledo, Ohio. Already the normalizing furnace is standard equipment in practically every sheet mill in America, while the continuous pair and sheet furnaces have been adopted by many plants in the short space of two years.

The time-honored method of rolling sheets consisted in heating the bars in a pair furnace and putting them through the breakdown rolls, after which they were reheated in a sheet furnace and given several passes in the finishing rolls, with reheats in between if necessary. This was accomplished with a single crew, and often one mill was idle. The new double-mill system, that is, with a separate crew operating each mill, was made possible only with continuous furnaces of greater capacity. The use of these has just about doubled the production of the standard sheet mill, without addition of extra units.

In rebuilding one of its sheet mills, the Apollo Steel Co., Apollo, Pa., has put in this new type of fur-

nace. The new mill is housed in three buildings erected together so as to form one, each "bay" being 250 ft. long and 80 ft. wide. Running inside and across the ends of this structure are spur railroad tracks, one bringing in the raw material (slabs, bars, etc.) and the other removing the finished products (sheets of all grades, including automobile sheets, corrugated roofing, etc.). Each bay is equipped with traveling cranes of 76-ft. span, the runways traversing the entire 250 ft.

Located in a central position, longitudinally, in the north building, the roll train consists of 10 stands, two-high, driven from one motor near the middle of the line. Included are four breakdown mills, on the east end, which supply three finishing mills on the west end, while one jobbing and two large mills occupy the central section. The pair and sheet furnaces are placed opposite these and along the north side of the center building. Adjacent to the breakdown rolls are four pair furnaces, while three sheet or pack furnaces serve the finishing rolls.

Walking-Beam Type of Conveyor Used

EACH pair furnace is of brick, steel incased, and is 25 ft. long and 8 ft. 8 in. wide. Each is supplied with a motor-driven walking beam of alloy rails which acts as a conveyor. These furnaces are automatic in operation and are controlled by the mill crew with a push button at the rolls. When hot metal is required the circuit is closed, and the walking beam "walks" the charge forward, so that a hot pair drops

PRACTICALLY double capacity is reported from the use of a continuous type of pair and sheet furnaces, without addition of extra units. In the equipment described a walking-beam type of conveyor is used in the furnace, to advance the steel being heated without in any way marring it. Steel is released from the furnace by push-button control from the rolls, which it reaches immediately on gravity rollers between furnace and mill.



DELIVERY side of sheet mills, with furnaces in background. Above at center is the special crane equipment, permitting the cab and load to run on to a monorail and thus into another department.

out at the discharge end on to a roller conveyor, which delivers it by gravity directly to the rolls.

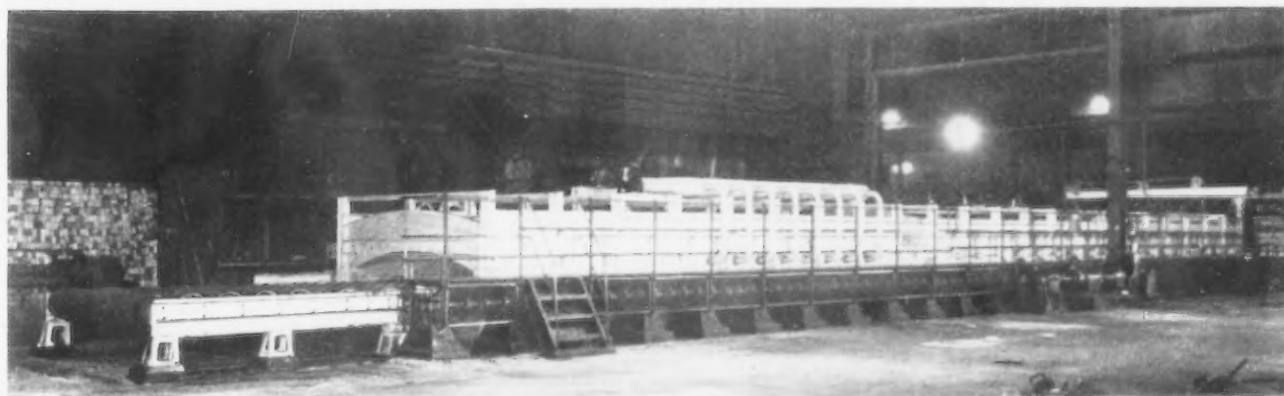
The firing system consists of a number of high-pressure two-stage velocity-type gas burners, located along both sides and staggered, so that they fire both above and below the work.

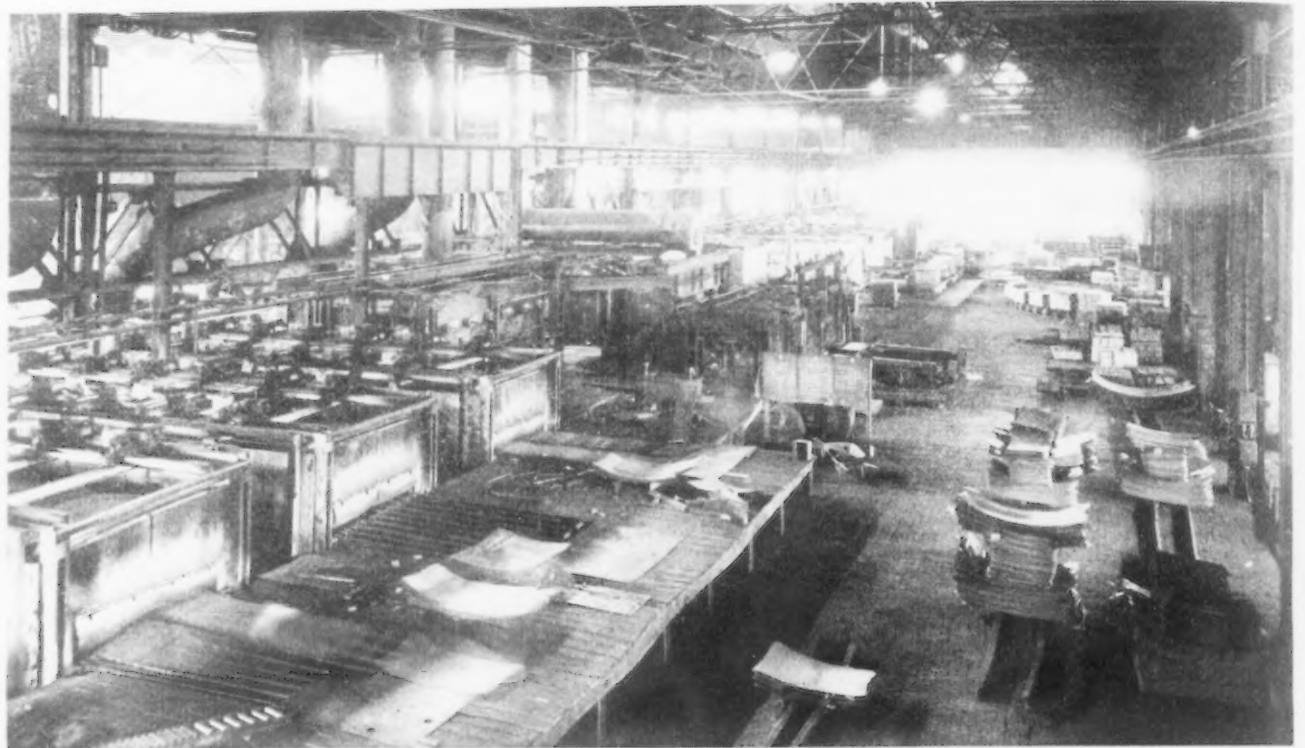
In the southeast corner of the center building is the pickling division. The work from the breakdown rolls is moved there by a unique form of transfer crane. The work is picked up by the regular crane and moved to the east end of the building. There the cab and load run on to a monorail and across the center building, where the work is deposited in one

of the pickle vats. A load of pickled work is then picked up and transferred to the center building crane, which delivers it to the sheet furnaces serving the finishing mills.

The sheet or pack furnaces are almost identical in design and construction with the pair furnaces already described; they are 5 ft. longer and are equipped with the same type of conveyor. This type of walking beam is something new in furnace design. In developing these furnaces it was early recognized that three major factors would have to be incorporated to accomplish the work for which they were being designed. These were as given on page 779.

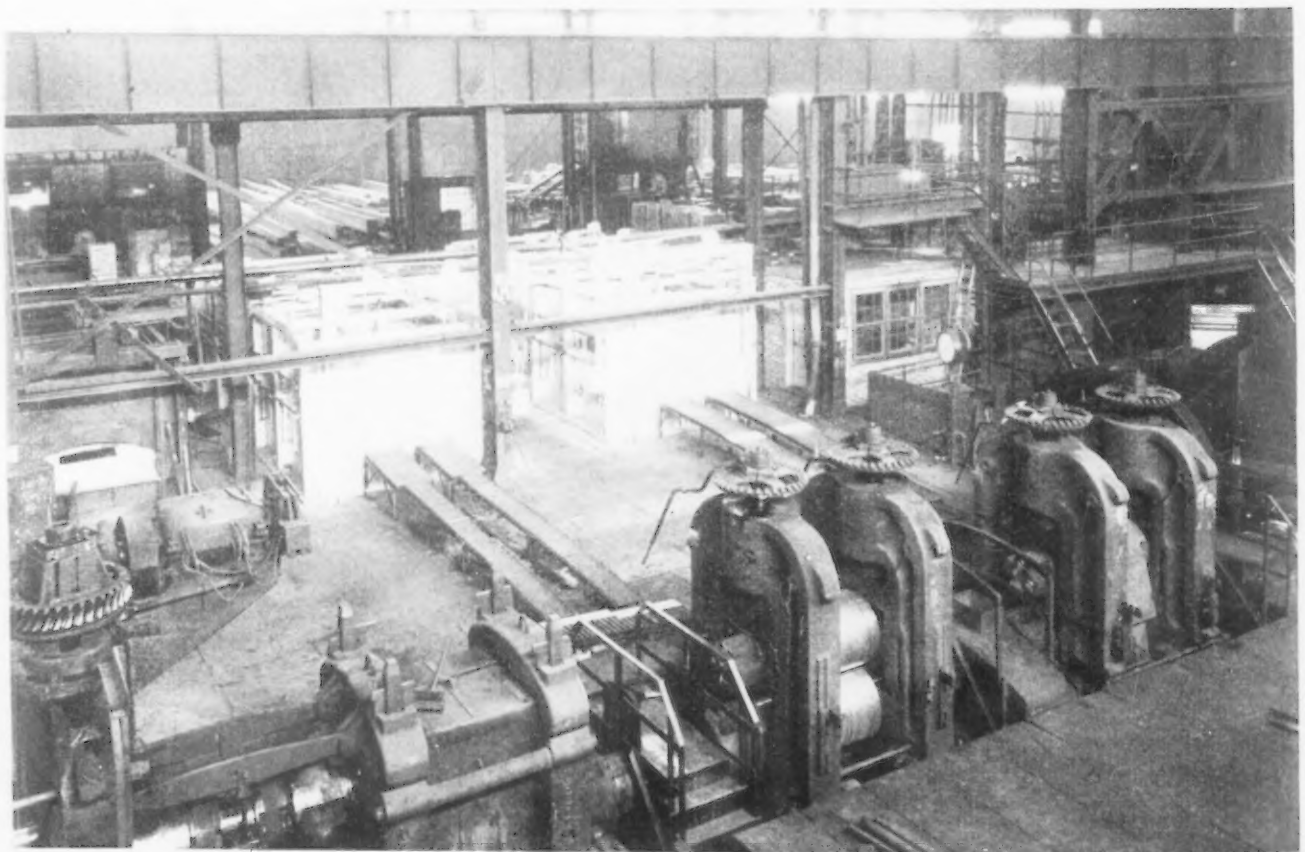
SHEET normalizing furnace, viewed from cooling zone end. The sheets pass through on rollers actuated by the long shaft, with gearing seen alongside the furnace.





CHARGING platform (above) for sheets, at rear of the finishing mill reheating furnaces. Sheets are carried through the furnaces by walking-beam conveyors.

PAIR furnaces and rolls (below), showing the lines of gravity rollers by which hot steel is passed from the furnace to the mill.



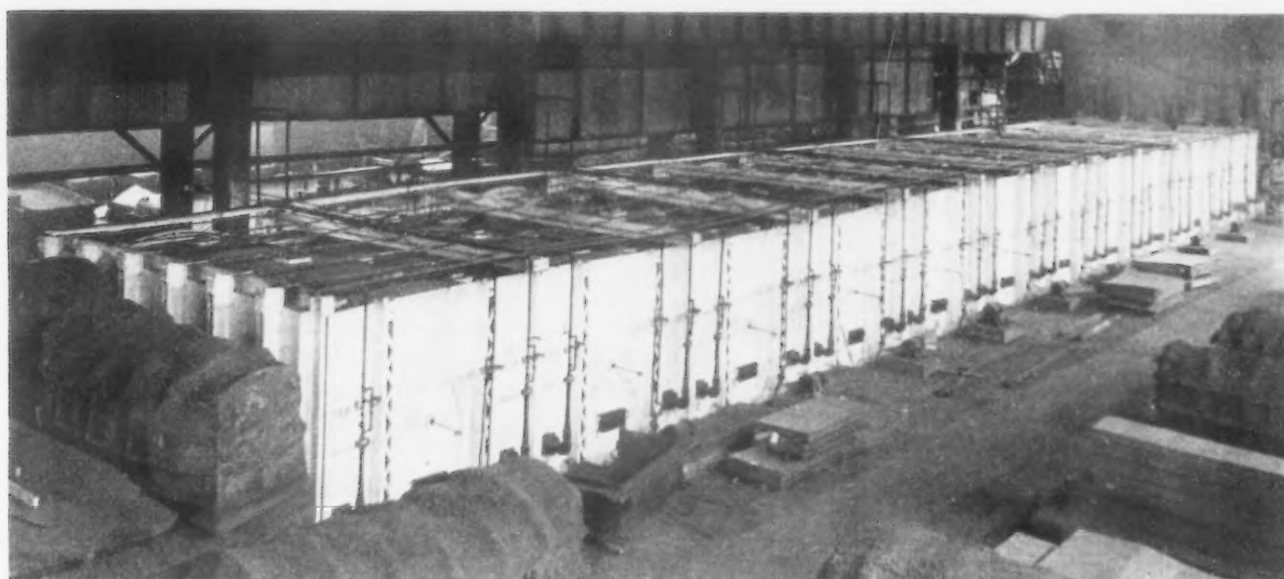
1. Firing from both above and below, so that the steel would be heated equally from both top and bottom and with complete uniformity.
2. Absolute tightness of furnace walls, bottom and roof, so that full control of the furnace atmosphere could be maintained.
3. A conveying mechanism that would handle the packs in such a manner that there could be no possibility of scratching or marring the surface.

Hence, for this latter reason the walking-beam type of conveyor was chosen for the sheet furnaces. The conveyor mechanism is entirely supported from overhead, a special steel framework being supplied for this purpose. The beams rise, lift the sheets or

rolling. Removal of the pack automatically starts the conveyor motor and the procedure is repeated. The firing system is similar to that used with the pair furnaces.

To balance the 8-hr. turn of the finishing mill, the breakdown mill is on a 6-hr. turn. During the 6-hr. turn each pair furnace will heat from 46,000 to 72,000 lb. of work, while each sheet furnace will heat from 48,000 to 90,000 lb. of work in an 8-hr. turn. The breakdown and finishing mills are operated with four and five men respectively.

First and last pack furnaces of the finishing mill on the line are equipped for double iron. The run-



▲ ▲ ▲ **R**EAR of the battery of 11 box-annealing furnaces, showing in left foreground the type of box used for holding sheets while in the furnace. ▲ ▲ ▲

packs, move them forward a predetermined amount and then sink, carefully depositing the work as they descend. The cycle of beam movement is rectangular instead of oval, so that the sheets are lifted vertically, moved forward and dropped in a straight line, which eliminates any possibility of slipping or dragging.

Furthermore, the driving mechanism is so designed that the upward and downward movements of the beams are retarded at the points where the packs are lifted and deposited, to assure further the careful handling of the work. This mechanism is operated with a motor through a speed-reduction gear train. The power requirements are reduced by so suspending the driving mechanism that the loaded conveyor beams swing forward by gravity; although a 7½-hp. motor is supplied, only 1 or 2 hp. is actually required.

Intermittent Operation to Suit Rolls

FOR obvious reasons this furnace is also semi-automatic in operation. The sheets or packs are loaded on to the receiving platform at the charging end and the conveyor steps them through the furnace from this point. When the first has reached a position directly in front of the discharge door it contacts a limit switch, which stops the conveyor motor. The pack then remains at this position until it is required for

over from the breakdown is heated in the pack furnace, given a single pass in the finishing rolls, doubled in the regular manner, reheated and finished. A motor-driven chain conveyor takes the packs from the press straight back to the charging end of the furnace, where the operator transfers them to the charging table.

Normalizing Under Close Temperature Control

FINISHED sheets, after passing through the square shears, go to the normalizing furnace or the box annealing furnaces, as the case may be. The normalizing furnace is of standard design, continuous in operation and consisting of a heating chamber and a cooling chamber. The latter is used to control the grain growth of the normalized sheets by maintaining the temperature within definite time limits. This furnace is 85 ft. long and the sheets are carried through by roller disks, mounted on shafts with bevel gears which mesh with similar gears on a single long drive shaft, which is motor driven.

A flat arch separates the heating and cooling chambers. Starting from this arch are a number of alloy tubes, 20 ft. long and just above the work. Fresh air of definite volume is blown in through these tubes to control the temperature more precisely in the cooling



▲ ▲ ▲ CHARGING side of six of the box-annealing furnaces, showing cannon balls on which the boxes ride and heaps of sand used for making air seals. ▲ ▲ ▲

zone. Standard two-stage high-pressure type burners are located in the side walls of the furnace, and in the heating chamber are so placed as to fire above and below the work. In the cooling chamber they fire below the work only.

Temperatures are automatically controlled, three thermocouples being located in the heating chamber and connected to indicating controllers, which in turn are connected with three motor-operated valves in the gas-supply lines. There are five additional couples, three in the heating and two in the cooling chambers, which are connected with a six-point recorder.

For box annealing setup there are 11 chambers built side by side in one setting, two for 72-in. sheets and nine for 48-in. sheets. In planning the size of these units the trend of the industry toward certain sizes of sheets was taken into consideration. Hence the internal dimensions of the two larger units are 17 ft. long and 8½ ft. wide. The smaller units are of the same length, but 2 ft. narrower. The height will permit the use of standard boxes up to 6½ ft. high, this dimension representing the distance from the tops of the cannon balls to the extreme top of the cover.

Each chamber is fired by means of six funnel-type gas burners, three firing from each end. These fire into ducts, one underneath the center of the furnace, and the others, one on each side. This arrangement permits heating the under portion of the work as well as the sides, and also permits a close temperature control, through both automatic and recording pyrometers.

The galvanizing furnaces were designed and built by the same concern. The largest holds a pot 8 ft. square and 4 ft. deep. The furnace walls are 1¼ ft. thick all around, including brick and insulation. The pot is heated with 10 gas burners on one side and two on each back corner. They fire into refractory beds, so as to supply radiated heat. The pot holds

132,000 lb. of spelter and sheets from 24 to 60 in. wide and No. 30 to No. 8 gage can be galvanized in it.

Sheets are handled through the pot by a rig consisting of three sets of motor-operated rolls, intake, bottom and exit. The capacity of this unit is 150 tons in 24 hr. It is associated with an individual stand of cold rolls. Air cylinders just above the exit rolls provide a means of regulating the pressure that the rolls exert against the sheets, which in turn regulates the thickness of the coating. This also gives a more uniform and a tighter coating.

Industrial Research Laboratories

A FOURTH edition of the list of Industrial Research Laboratories of the United States, including consulting research laboratories, has been published by the National Research Council, Washington, as Bulletin No. 81. This is available at \$2 a copy. It is a paper-bound book of 267 pages and is well cross-indexed as between company and research directors.

About 1625 laboratories are listed in the main section of the directory, alphabetically arranged according to name of the owning company. In cases where a subsidiary company is represented, there is always a cross-reference to the parent company. This section covers about three-fourths of the book.

Following this is an alphabetical list of directors of research of the foregoing companies, with their addresses; and then a geographical list arranged in alphabetical order of the States and towns, showing the locations of the various laboratories covered in the directory. This is followed by a still further break-up according to the subject classification of laboratory activities.

In the first section—the alphabetical list of companies—the whole story is told in each instance of what the laboratory has to do, how large a staff it maintains, and the general character of its work. It may be mentioned that the list has increased by more than 60 per cent since the publication of the 1927 edition, at which time there were about 1000 listed, and that there are about 1900 directors of research.

Inclusions and Their Effect on Impact Strength of Steel

By A. B. KINZEL and WALTER CRAFTS

INCLUSIONS of non-metallic matter have long been recognized as objectionable in steel. A complete theory of the effect of inclusions, which is consistent with that held today, was outlined in Howe's early work on the metallurgy of iron and steel.

It is the specific purpose of this study, sponsored by the alloy steel committee, Iron and Steel Division, A. I. M. E., to determine the quantitative effect of inclusions on the physical properties of steel that determine its behavior under dynamic stress. The study has shown that a quantitative relation between counted inclusions and impact strength does exist in normalized steels, but that factors other than readily visible inclusions are equally important. Furthermore, the present commercial rating of inclusions is unreliable with respect to counted inclusions or dynamic tests, and this study indicates that the tensile-impact test is more reliable as a measure of quality.

General Scheme

Our general plan of study was: (1) To develop or establish a satisfactory measure of dynamic strength;

(2) to develop or establish a satisfactory method of quantitatively measuring the inclusions; (3) to determine the relation of variation of dynamic strength to the variation of inclusions as measured; (4) to determine, by chemical methods, which if any of the types of inclusions present are most serious in affecting the dynamic strength; (5) to establish the relative importance of factors other than inclusions which affect the dynamic properties.

On carrying out this scheme, it was found that the tensile-impact test and careful microscopic count gave results which were sufficiently accurate to determine the loss of shock resistance due to inclusions in the steels investigated. This reduction of strength was found to be large, and was materially influenced by the hardness of the material. Chemical analyses showed that the visible inclusion content and impact strength are proportional to a ratio of oxidic inclusions to sulphur content.

Furthermore, by means of inclusion analysis and vacuum fusion determination of oxygen, large erratic deviations in impact strength which are not due to visible inclusions have been found to be associated with non-metallics which are too small to be seen in the microscope or to collect on filter paper.

Measure of Dynamic Strength

MEASUREMENT of dynamic strength is in itself a difficult problem when accurate and consistent values are desired. The great difficulty in duplicating results in the usual notched bar Izod, Charpy or similar tests, even with the greatest care in preparation of the specimens, is well known. When longitudinal and transverse values are considered, interpretation of the results of such tests is very difficult.

Our previous experience had shown that tensile-impact specimens give extremely good results, when carefully prepared. Therefore, specimens of this type were used, with consistent results, as indicated by duplicate tests. A sketch of this type of specimen is shown in Fig. 1. As the diameter is small, care was taken to avoid any twisting of the specimen in machining, and the surface was ground with fine emery cloth to free it from circumferential scratches. No other special precautions were taken. The test was carried out on a standard 120-ft.-lb. Izod machine, the

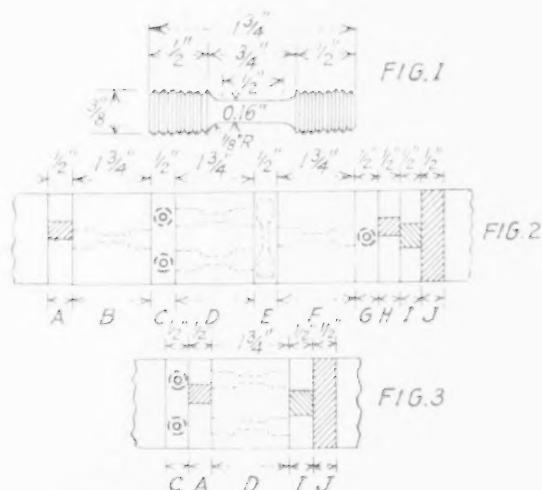


FIG. 1.—TENSILE IMPACT SPECIMEN.

FIG. 2.—LOCATION OF SPECIMENS IN ROUND BARS.

FIG. 3.—LOCATION OF SPECIMENS IN SQUARE BARS.

- A. and H.—Micro for inclusion count.
- B. and F.—Tensile impact, center, longitudinal.
- C.—Tensile impact, midway, transverse.
- D.—Tensile impact, midway, longitudinal.
- E. and G.—Tensile impact, center, transverse.
- I.—Oxygen by vacuum fusion.
- J.—Turnings for analysis.

hammer being dropped from the full 120-ft.-lb. energy level in all cases.

Specimens were taken from the centers of the bars and from midway between center and surface, in longitudinal and transverse directions, as shown in Figs. 2 and 3. Both impact strength and elongation of each specimen were determined. From this, as well as from past work, the limit of accuracy in impact strength and elongation is considered to be approximately 5 per cent.

Estimation of Inclusions

QUANTITATIVE estimation of inclusion content was made by photographing a representative number of fields at a magnification of 50 diameters. The plates were then enlarged by projection on a screen, and the inclusions were counted with respect to length, in brackets of graduated length. The summaries of this count, expressed in number of inclusions of a given size per square millimeter, are shown in the table, in which the number figure is the total number of inclusions per square millimeter, and the total-length figure is the sum of the lengths of all of the inclusions per square millimeter, as if they were placed end to end.

Specimens were polished on the longitudinal section of a plane through the center of the bar, the whole section from one side to the other being used, although it was divided into two or three parts for ease in polishing. The polishing technique was that developed at these laboratories, in which all grinding and polishing up to the final stage is carried out on dry paper, and the final wet polishing with alumina on silk is reduced to a minimum. Past experience has shown that this method results in a quantitative retention of inclusions without exaggeration of their size caused by pitting around the inclusions.

NON-METALLIC inclusions have a direct effect on the strength values of steel and this effect is intensified in the harder steels, according to a paper, herewith abstracted, which was read Feb. 18 before the American Institute of Mining and Metallurgical Engineers in New York. Aggregate length of all microscopically visible inclusions in a standard area was taken as a satisfactory measure of the "cleanliness" of steel. Similarly, the tensile-impact test was found to be a satisfactory measure of the dynamic quality of the steels studied.

In addition, all specimens were etched with 10 per cent aqueous chromic acid solution, to darken the sulphides and make them more readily visible, as this etch does not attack the metal or any inclusions other than sulphides. Careful study of specimens before and after etching has shown that the apparent size of the inclusions is not affected. Should the sulphides be over-etched, seepage of liquid occurs and is readily recognized.

Conclusions

Following are conclusions based on the steels here studied. While some are no doubt subject to modi-

RESULTS OF INCLUSION COUNT AND TENSILE IMPACT TESTS

Specimen No.	Location	Length Brackets for Counting, Mm.								Number of Inclusions per sq. Mm.	Total Length of Inclusions, mil. per Rat. Sq. Mm.	Average Impact Strength, Ft. Lb.		Average Elongation Per Cent in 1/2 In.		
		0.005 to 0.009	0.009 to 0.019	0.019 to 0.037	0.037 to 0.075	0.075 to 0.15	0.15 to 0.25	0.25 to 0.35	0.35 to 0.45			Longl.	Transv.	Longl.	Transv.	
		NUMBER OF INCLUSIONS PER SQUARE MILLIMETER														
11	Midway	66.3	6.78	2.15	0.93	0.56	0.09	—	—	76.8	0.667	7.5	28.25	25.0	41.0	35.0
11	Center	61.7	8.15	2.66	1.43	1.06	0.36	0.09	—	78.9	0.856	7.5	27.75	22.25	40.0	33.0
12	Midway	54.3	10.38	2.28	0.71	0.31	—	—	—	68.0	0.593	4.0	28.5	26.75	41.0	36.0
12	Center	54.6	7.87	1.95	0.95	0.65	0.05	—	—	66.1	0.624	4.0	28.25	25.0	41.0	35.0
13	Midway	60.0	8.19	2.55	0.87	0.34	0.06	—	—	71.8	0.641	10.0	27.25	27.25	40.0	38.0
13	Center	61.7	8.05	1.90	0.55	0.05	—	—	—	72.2	0.566	10.0	28.0	24.25	40.0	33.0
21	Midway	65.8	10.75	2.29	0.58	0.23	0.02	0.02	—	80.7	0.690	4.5	30.0	28.5	39.0	37.25
21	Center	63.2	11.10	2.78	0.65	0.19	—	—	—	78.2	0.686	4.5	28.75	25.25	39.0	34.0
22	Midway	59.2	7.26	1.60	0.43	0.09	0.03	—	—	68.6	0.537	2.5	28.25	26.5	38.5	33.0
22	Center	60.0	5.63	1.43	0.51	0.28	—	—	—	68.1	0.536	2.5	29.0	24.5	39.0	32.0
31A	Midway	51.2	7.64	2.35	1.11	0.44	—	—	—	42.8	0.450	3.3	29.75	27.25	40.0	35.0
31B	Midway	55.5	3.88	1.70	0.50	0.15	—	—	—	42.8	0.370	3.3	28.75	27.0	37.0	34.0
41A	Midway	65.7	8.00	2.37	0.14	0.30	0.08	—	—	76.9	0.638	8.8	28.0	23.5	38.0	31.0
41B	Midway	62.7	15.91	2.59	0.89	0.15	—	0.15	—	83.4	0.784	8.8	26.25	27.25	32.0	34.0
51A	Midway	47.4	6.32	1.50	0.30	—	—	—	—	55.8	0.432	3.0	29.0	28.0	40.0	36.0
51B	Midway	50.5	10.22	1.85	0.59	0.32	—	—	—	49.7	0.446	2.0	29.5	29.25	39.0	38.0
62A	Midway	57.8	8.15	2.96	1.33	0.59	0.15	0.08	—	71.1	0.716	7.0	28.0	25.5	39.0	35.0
62B	Midway	81.8	8.67	2.78	1.26	0.08	—	—	—	93.6	0.786	7.0	29.25	24.5	40.0	33.0
61	Midway	59.4	11.47	2.16	1.68	0.43	0.03	—	—	73.7	0.712	9.0	28.5	26.25	33.0	18.0
61	Center	54.4	11.56	1.26	1.14	0.47	—	0.05	—	69.0	0.702	9.0	29.5	22.5	33.0	22.0
71	Midway	47.3	8.93	2.41	0.52	0.09	—	—	—	59.0	0.501	8.0	31.25	24.0	35.0	25.0
71	Center	50.2	10.42	3.70	0.92	0.18	0.06	—	—	65.5	0.613	8.0	30.0	24.5	34.0	27.0
72	Midway	51.7	8.82	2.30	1.17	0.21	0.07	—	—	66.1	0.612	8.0	31.0	24.0	34.0	24.0
72	Center	49.5	10.67	0.61	1.31	0.12	0.06	—	—	65.3	0.643	8.0	28.5	24.75	31.0	27.0
81	Midway	67.0	12.68	0.28	2.68	1.45	0.15	—	—	86.2	1.022	3.0	31.5	18.5	34.0	17.0
81	Center	55.6	6.47	4.61	2.07	1.38	0.10	—	—	75.2	0.840	3.0	27.0	17.25	23.0	16.0
82	Midway	52.9	12.50	3.87	2.71	1.45	0.22	0.06	—	76.9	0.972	3.0	27.5	25.25	32.0	22.0
82	Center	55.6	12.78	6.24	2.53	1.05	0.00	—	—	78.3	0.906	3.0	29.75	22.75	30.0	20.0

fication, others by their very nature are sufficiently well established to apply generally.

1. The dynamic strength of steels is quantitatively reduced by visible inclusions or factors directly proportional to them.

2. The magnitude of the effect of inclusions on the dynamic strength increases with the hardness of the steel.

3. Factors other than visible inclusions have an important influence on the dynamic strength of steels, and are comprised in the term "body."

4. Body is markedly influenced by minute inclusions whose size is less than 0.005 mm.

5. Visible inclusions are directly proportional to the ratio of extracted inclusions to sulphides in the steels studied.

6. The "total length" of inclusions per square millimeter is a satisfactory measure of the cleanliness of steels.

7. The tensile-impact test is a satisfactory measure of the dynamic quality of steels.

8. The present commercial inclusion rating is not a reliable measure of the cleanliness or dynamic strength of steels, although it does give satisfactory indications in many instances.

Discussion on Inclusions in Steel

POINTING out that the effects on the steel of inclusions which may be seen readily may be almost entirely masked by some extraneous factors, Dr. Reginald S. Dean, United States Bureau of Mines, Washington, questions the adequacy of the analyses made by Dr. Kinzel in his paper and, by inference, the adequacy of the conclusions drawn. Dr. Dean said in particular that, where the plotted results come out in something of a shotgun pattern, without showing any

too clearly what the trend may be, this question as to adequacy is especially valid.

To this criticism Dr. Kinzel retorted that certain causal effects had been eliminated in the analysis which was made, and that the report deals, consequently, with the results as adjusted after such elimination.

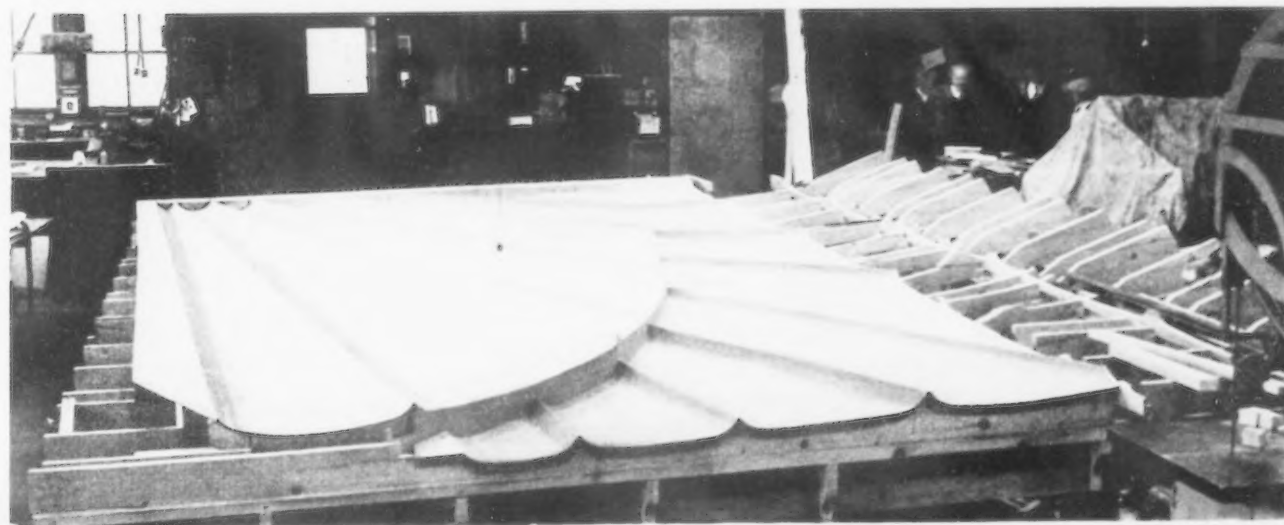
Dr. Haakon Styri, of S.K.F. Laboratories, Philadelphia, referred to some gun-steel tests made in 1918, in which about 100 test pieces were examined under the microscope at a magnification of 80 diameters and tabulated in accordance with the quantity of slag inclusions. Then the tensile and ductile tests of the same samples were plotted and the results compared. A definite relation was found between the slag inclusions and the corresponding ductility tests. No such relation could be discovered, however, between the slag inclusions, on the one hand, and the elastic limit and tensile strength tests on the other.

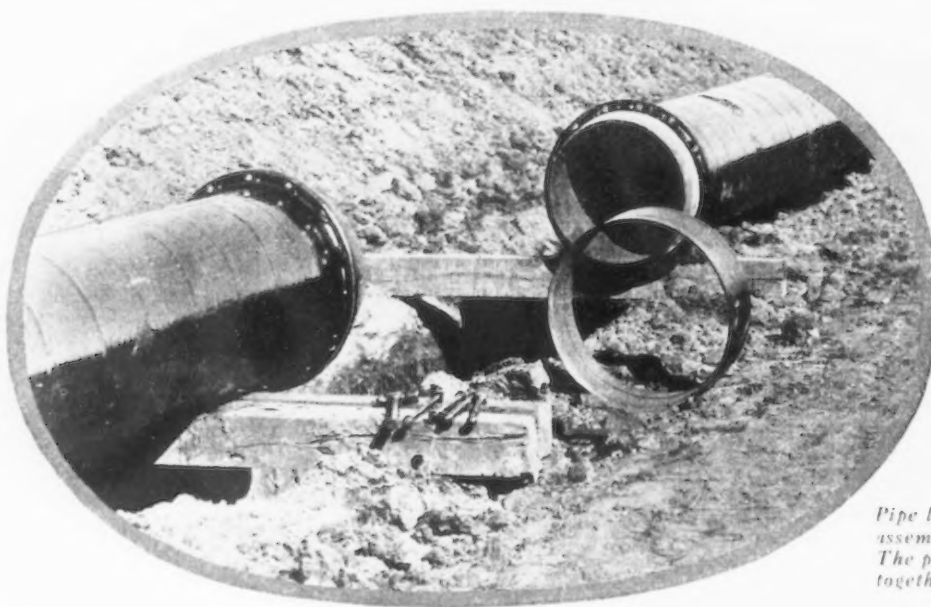
Rail Steel Inclusions Studied

When steel containing inclusions is elongated by rolling, these inclusions elongate plastically with the metal, according to Dr. I. N. Goff, of the research laboratories of the Inland Steel Co., Indiana Harbor, Ind. Consequently, when examined under the microscope, the inclusions appear as attenuated strands parallel to the length of the bar. When cut transversely, they appear merely as small dots and give a totally different effect.

This whole discussion of inclusions and their effect on strength of steel, he said, is of particular interest to the manufacturers and users of rail steel. There has for a long time been a trend toward the use of harder steel for rails. By eliminating so far as possible the presence of these inclusions, the industry is going to get away from some of the detrimental effects heretofore encountered in the employment of hard steel for this purpose.

WOOD pattern used at the Cleveland foundry of the Aluminum Co. of America in casting a section of the decorative aluminum alloy wings which will be at the four corners of the tower on the Empire State Building, New York. To permit easier handling and shipping, the large wing sections were cast in small sub-sections to be assembled on the job. The wings, as well as the aluminum alloy covering the tower, are being finished by sand blasting, after which they are sprayed with a liquid solution containing 16 per cent white paraffin, and rubbed with cheese cloth. The result is a compromise between a sand blasted and a deplated finish.





Pipe line in process of assembly in the field. The parts of the flange, together with bolts, are shown.

Heat-Treated Pipe Couplings for Long-Distance Gas Lines

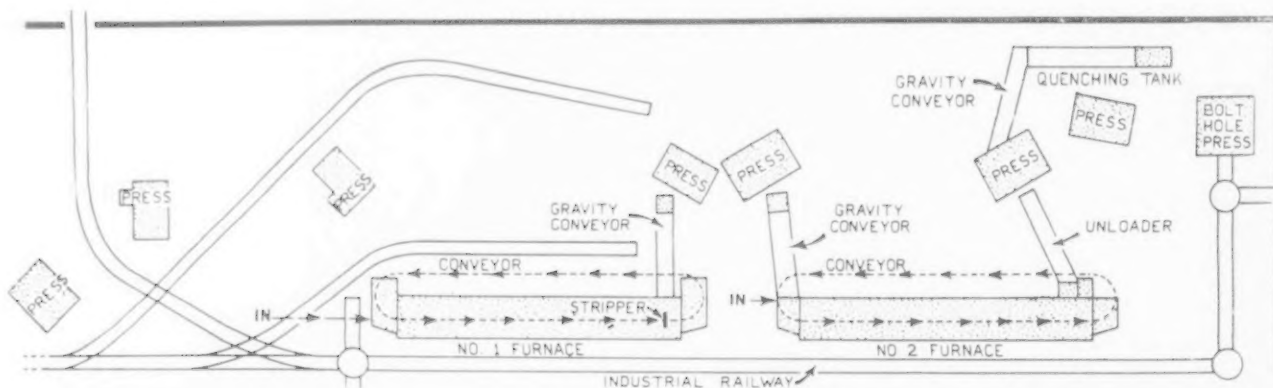
MANY problems had to be solved before the latest and longest pipe lines for gas transportation could be built. One of these was that of stronger couplings, for, the longer the lines the higher the pressures required. The 1400-mile Texas-Chicago line, for instance, calls for working pressures up to 800 lb. This problem was solved by S. R. Dresser Mfg. Co., Bradford, Pa., in a coupling consisting of a middle ring, two flanges, gaskets and bolts to hold the assembly together. These have been in use in the oil and gas pipe-line industry for a great many years.

Demand for couplings of greater strength was met by an extension to the plant, with new and more powerful machinery, at the cost of \$500,000. Large

furnaces, fired with natural gas, continuous and automatic in operation, were installed. At the same time the plant was expanded, more lines of manufacture being added.

These lines, like the others, are of the progressive, straight-line production type, and the furnaces were simply put in at the proper points. Where hot forming was necessary, as with the flanges, two furnaces are used in tandem, the first to bring the blanks to forging temperature and the second for reheating. These furnaces were designed and built by the Surface Combustion Co., Toledo, Ohio.

In the new flange department plate steel is brought in on industrial cars to the blanking presses, the resulting blanks for the larger sizes being 32 in. in



Layout of the furnace and press department, showing overhead conveyors in dotted lines and gravity and other conveyors in solid lines.



Outside of the two furnaces, showing the gas connections by means of which they are fired. In foreground are piles of blanks for forming flanges.

diameter and $\frac{1}{2}$ in. thick. These are charged into the loading end of the forging furnace and drop out automatically on to a gravity conveyor at the unloading end, and are delivered hot to the forming presses.

There are two formings, which require two presses. The blanks are handed from one to the other by an operator with tongs and then dropped on to a gravity conveyor, which takes them to the loading end of the heat-treating furnace, where another operator hangs them on to the conveyor. At the unloading end they automatically drop off on to another gravity conveyor and pass successively through a forming press, a quench and a bolt hole press.

This forging furnace is 42 ft. long, $3\frac{1}{2}$ ft. wide and 4 ft. high from hearth to the flat arch. The side walls consist of approximately 9 in. of firebrick and $4\frac{1}{2}$ in. of insulation, while the special suspended flat arch is constructed of special fireclay shapes and 6 in. of insulation. This flat arch carries, throughout its entire length, a narrow slot through which pass the alloy hooks suspended from the conveyor. The whole is incased in steel plates and the buckstays are carried to a sufficient height to give the proper support to the conveying mechanism.

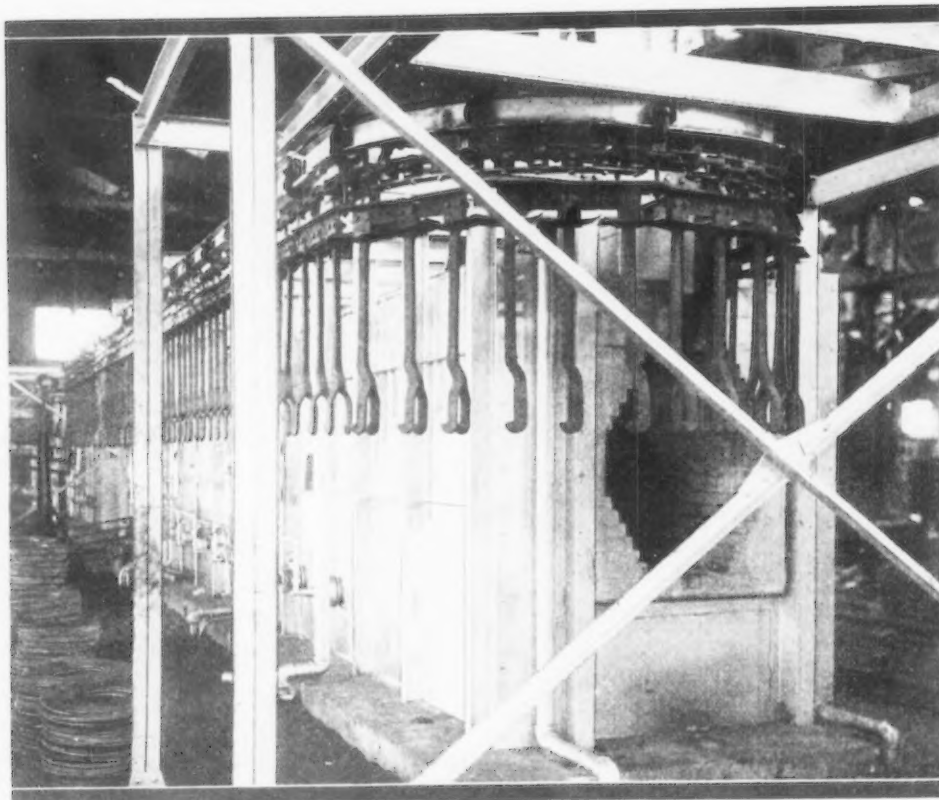
This conveyor mechanism consists of an endless chain, operating in a water-cooled track, suspended

just above the furnace, and carrying alloy-steel hooks which project down into the furnace, through the slot in the arch. One line of this endless chain is directly over the slot in the furnace arch, while the other line is away from the furnace, so that the hooks travel back to the charging end entirely outside. There is no loss of heat through this slot, for a series of short steel plates on the shanks of the hooks forms a continuous seal. The chain is stretched between two sprockets and the mechanism is driven by a motor through a speed-reduction gear train.

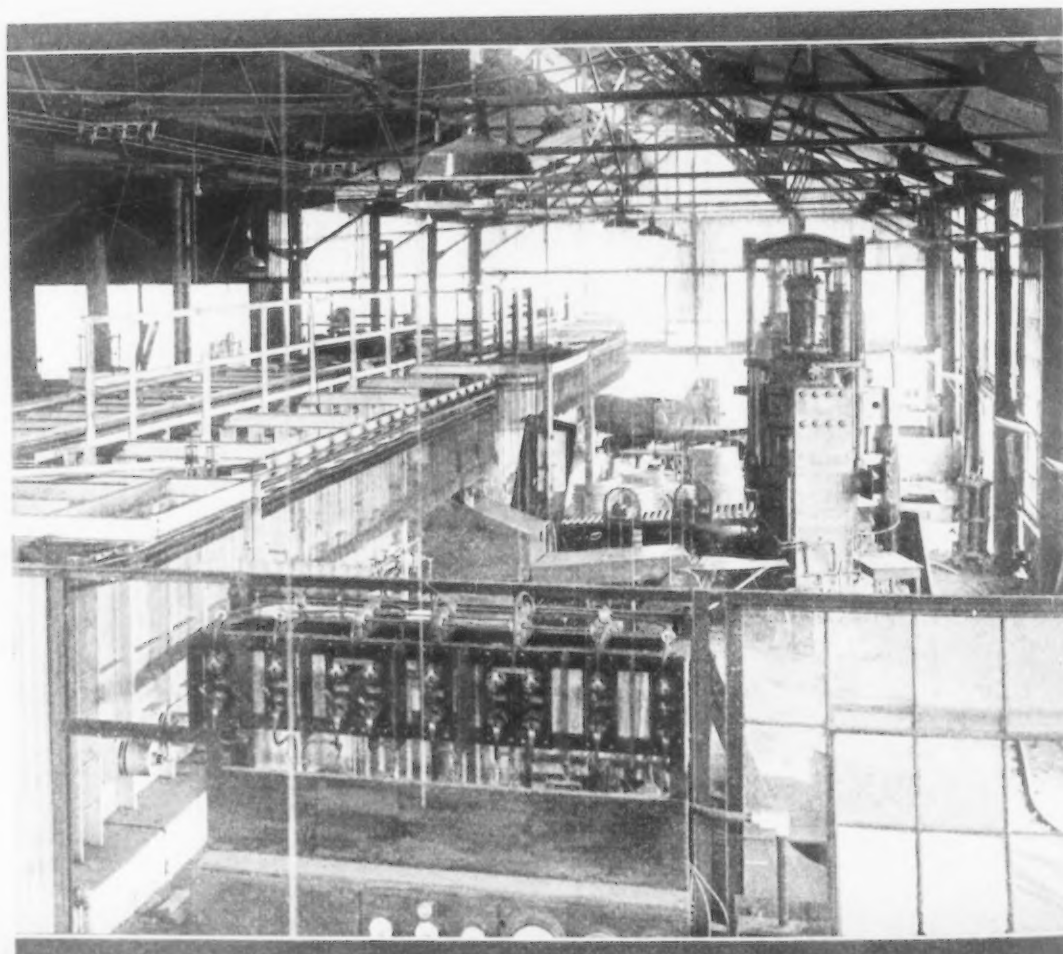
Overall length of this conveyor is 66 ft., while the distance between the parallel lines of chain is 6 ft. No door is provided at the entrance end, as the opening here is made in the same size and shape as the blanks passing through. The fact that these blanks are quite close together, and that this end of the furnace is designed for preheating only, prevents the loss of much heat. When smaller blanks are treated, the excess space is closed with specially made steel forms.

At the other end, a side slot discharge is provided and a stationary stripper causes the blanks to drop off the hooks as they pass by, into a narrow inclined chute, down which they roll direct to the forming press. The operating mechanism is provided with a reversing device, so that, in the event that the form-

ONE of the ramifications of the thriving business of installing pipe lines lies in the preparation of couplings which make a high-pressure line possible. How these couplings are made and heat treated is told in some detail in this article. Continuous conveyors are employed, carrying the parts through both the forging furnace and the heat-treating furnace. By thus avoiding heavy handling costs a high-grade coupling can be made at a reasonable unit cost.



Entrance end of furnace, showing how the carrying members traverse the outside and pass around sprocket at the end of their parallel run, taking the work in through a shaped opening.



General view of the two furnaces at left, and one of the presses in right background. This shows the excellent natural lighting obtained in daytime. The roller conveyor between furnace and press appears in center.

ing presses are stopped for any reason, the entire charge can be quickly run out of the furnace before it is overheated.

Heating of this furnace is accomplished through the use of 26 wide-range velocity-type gas burners, firing below the hearth level in the heating zone. They are so arranged as to fire from both sides of the furnace and thereby provide uniform heating of the entire cross-section. Gas is supplied at 25 lb. pressure, this pressure being built up in a compressor.

Temperatures of this furnace are controlled through two automatic control pyrometers, supplied with recorders and connected with two mechanically-operated valves in the gas-supply lines. The operating temperature is 1750 deg. Fahr., while the blanks are delivered to the presses at 1600 deg. Fahr. From the second press they are returned to the charging end of the reheating furnace and placed on the hooks. These flanges enter the furnace already preheated, for they still are at approximately 1200 deg. Fahr.

The reheating furnace is similar in general to the forging furnace, the entrance being the same, also the unloading device and chute at the discharge end. This stripping mechanism is a special feature and serves to strip the hot semi-formed couplings from the hooks and deliver them to the chute in the side discharge opening.

The burner equipment is the same except that the burners are distributed over the entire length of the furnace. The temperature required, in this case, is 1950 deg. Fahr., and is controlled as described. The steel disk that went through the first furnace has

now been elongated to a maximum length of 3 in. on the flange. The maximum weight of each piece, disk or flange, is 67 lb. Small disks, down to 15 in. in diameter and $\frac{1}{4}$ in. thick, are processed in this set-up, also. The capacity of the unit is 18,000 net lb. of work an hour (268 pieces).

The flanges are finish formed in a press close to the discharge end of the second furnace. From there they go, by gravity conveyor, into the quench tank for hardening. This steel tank, 20 ft. long and 3 ft. wide, is equipped with a traveling conveyor which takes the work through and then lifts it out at the further end. Thence it is put into another press and the bolt holes are punched. This finishes the flanges.

The layout for the middle ring consists of shears which cut skelp to the proper lengths. These pieces are formed to ring shape in a set of power rolls. The ends are then ground for grips and they are passed into flash welders, where the joints are welded tight. They then pass through heat-treating furnaces and are quenched. The feature of this layout is that, from the rolls on, the rings are delivered, or rolled from one process to the other, along inclined runways. Even the furnaces are built long and narrow, with inclined hearths, so that the pieces roll through, without any mechanical aid, and directly into the quench.

They are lifted out of the quench and put on to another series of runways that take them successively through the chipping department and three forming presses. Every ring is then subjected to an air-pressure test. From the last press they are hung on an overhead conveyor which takes them to cars or storage.

Measures Stress in Welded Steel Pedestals for Bridges

NEARLY all steel bridges are supported on pedestals which distribute the highly concentrated pressures at the top of the pedestals over larger areas at the base so that safe bearing pressures are not exceeded on the masonry or concrete piers, according to the Bureau of Standards.

The American Bridge Co. made designs for welded steel pedestals and, because they represented a rather radical departure from the present practice, requested the bureau to conduct tests on samples in the 10,000-000-lb. capacity testing machine to determine their safety and also to study the stress distribution so that the most efficient design might be used. The welded steel pedestals were found to be amply strong to withstand the loads for which they were designed. The stress study was made by means of a small instrument called a strain gage, which was designed by H. L. Whittemore, a member of the bureau's staff, and by means of which the shortening in the parts of the pedestal could be determined to one ten-thousandth part of an inch. Measurements made with this instrument, while the pedestals were under load in the testing machine, showed which design gave a most uniform stress distribution and also indicated how the designs might be improved. These tests are described

in greater detail in the October number of the Bureau of Standards *Journal of Research*.

Annealing of Chilled-Tread Car Wheels

A PAMPHLET issued by the Speed Scientific School, University of Louisville, deals in 27 pages with annealing of car wheels with chilled treads in the foundry of the Louisville Car Wheel & Railway Supply Co. The paper was prepared by B. M. Bridgeman, dean, and J. W. Huckert, assistant professor of mechanical engineering. Among the conclusions are the following:

The top wheel in an annealing pit cools fastest and the bottom wheel slowest. All other wheels cool at intermediary rates. The difference in temperature between the plates of top and second wheels is about one-fourth the difference between the top and bottom wheels. Annealing curves for seven-day tests differed very little from five-day tests. This indicates that nothing was gained by the additional two days in the pits.

To anneal a wheel properly the temperature on both sides of the plate should be practically the same. The average top or bottom wheel made a poorer showing in the drop test than the average wheel from any other position in the pit. This was held due to the inequality in the temperature of its sides during annealing. Wheels tend to be larger in diameter toward the bottom of the pit.

Electrically Heated Roller-Hearth Furnace Hardens Sprockets

By H. E. SCARBROUGH

High heat heating specialist,
American Electric Co.,
Chicago

ABOUT two years ago the Caterpillar Tractor Co., at Peoria, Ill., decided to install a continuous furnace for heating cast steel sprockets previous to a quenching operation. For the hardening operation the sprockets are heated to approximately 1650 deg. Fahr. and quenched in water. Four sprockets are required for each tractor and a furnace to handle approximately 200 sprockets a day was required, the furnace to operate 24 hr. a day.

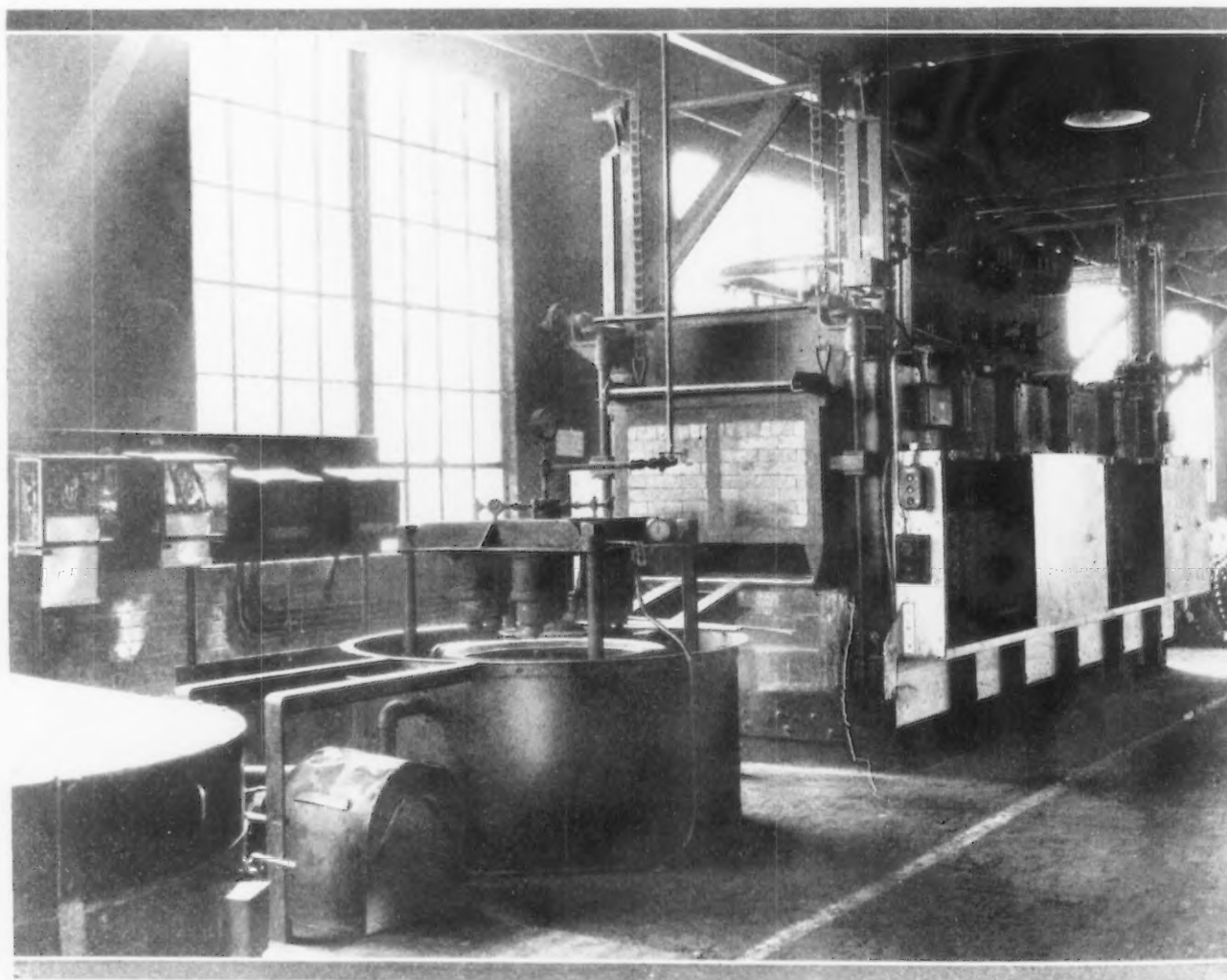
Several different types of furnaces were considered for the application.

It was finally decided, however, that the most flexible and most logical furnace for the job would be a roller-hearth type. Having decided on this type of furnace, it was necessary to install a double deck of rollers, to cut down the overall length. The sprockets might have been piled two

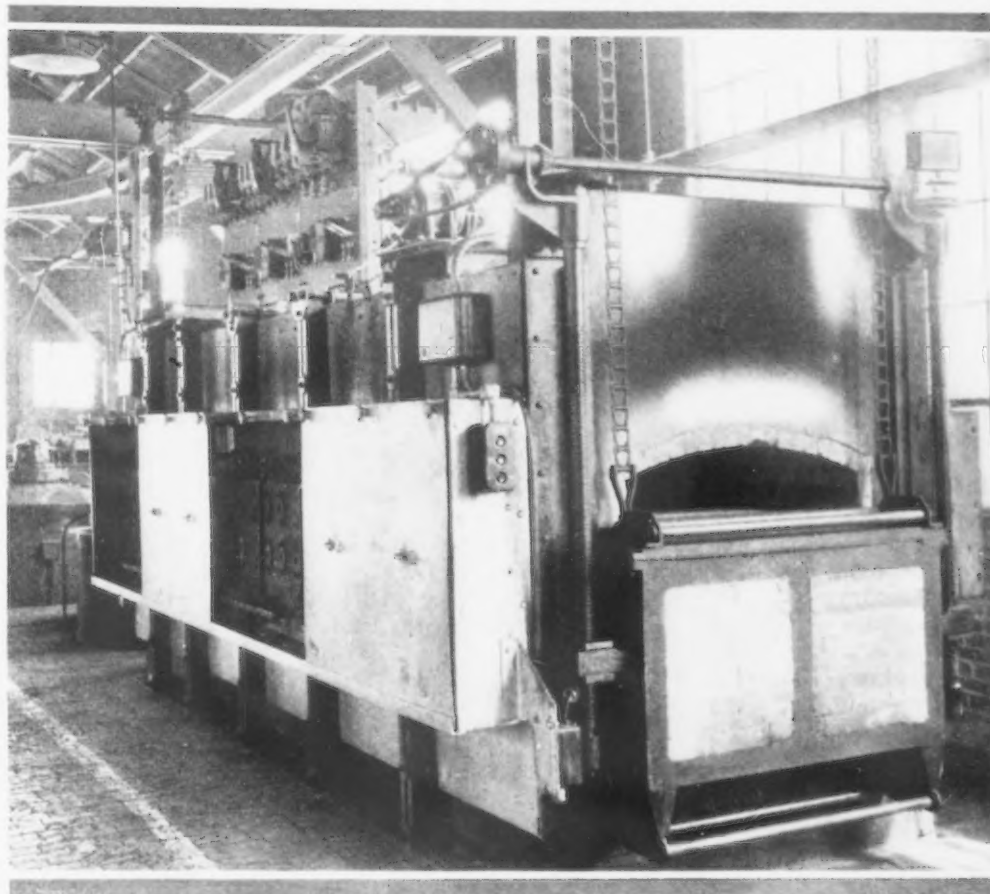
high on one roller hearth, but this was objectionable, as individual heating and quenching was required. A double-deck roller-hearth furnace was, therefore, installed. This furnace has now been operating a little over a year and has proved to be very satisfactory.

One view shows the charging end of the furnace, with the door in position for charging the upper tier of rollers. Some of the protecting side plates have been removed, showing the interconnection of the heating units and the two rows of bearings

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DISCHARGE end of the furnace, with quenching tank in foreground. The material slides down the incline and is easily handled into the quench. Control instruments at left.



EXCELLENT results are reported from the use of a furnace with roller hearth in which cast steel sprockets are heated previous to quenching. Many of the precautions undertaken to conserve heat in this electrically-heated unit are described here. The furnace has shown a performance of about 8½ lb. of product for each kwhr. consumed.



CHARGING end of the furnace, showing the movable door at bottom right. Rollers at top and bottom of door ease entrance of sprockets into the two chambers of the furnace.

for the rollers. This view also very clearly shows the motor-driven door mechanism and a push button station for operating the doors. It is also to be noted that the door-operating mechanism is equipped with limit switches at top and bottom, to stop the door in the correct position for loading.

In the general view of the furnace from the discharge end, the door is in position for discharging sprockets from the lower tier of rollers. This shows how the three panels for controlling the three separate heating zones of the furnace are mounted up over the furnace. This conserves space and puts the panels where they are not apt to be injured by materials-handling trucks. Leeds & Northrup control instruments are mounted on the wall alongside the window.

In the foreground is the quenching and discharging mechanism. Two skid rails are provided, the furnace end of which can be lowered or raised to accommodate either tier of rollers. The sprocket to be quenched is pulled out on to these skid rails by a hook and put into the quenching mechanism. The sprocket is quenched in a fixture under pressure, to hold it straight during the quenching operation. Water is sprayed on the outer edge of the sprocket, so that a

very hard tooth is obtained, while the spokes and the hub remain in a tough state, not quite so hard as the outer rim and teeth.

The furnace is approximately 36 in. wide by 16 ft. long inside, wall to wall dimensions. The effective heating length inside is approximately 14 ft. 4 in., the remainder being allowed for removing the sprockets, at the discharge end. In overall dimensions the furnace is approximately 6 ft. 11 in. wide, by 20 ft. long, by about 7 ft. high.

This equipment was designed to handle sprockets up to 32 in. outside diameter. Because of the thickness of the hub on the sprocket it was estimated that a 2-hr. heating and soaking period would be required. Forty-five minutes of the total time was required for soaking, after the sprockets were brought to temperature in 75 min.

The rolls are spaced on 6-in. centers on each deck, there being 36 rolls in each deck from door to door. Both sets of rollers are driven by an a. c. induction motor, with speed changers and variable-speed drive. All rollers are sprocket-and-chain driven. The rolls, 2 in. in diameter, are made of heat-resisting alloy castings.

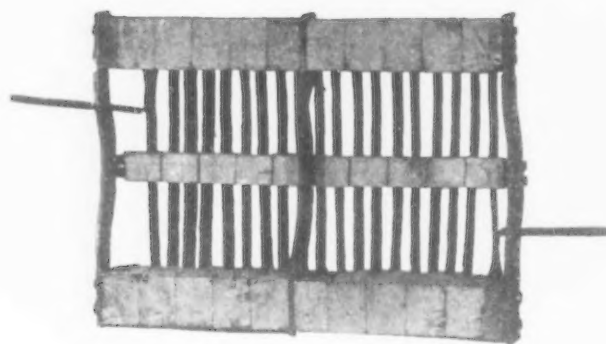
The sprockets under treatment are placed in the furnace alternately, so

that only one sprocket reaches the discharge position at a time.

The roller (in each set) at the end of the active length of the furnace is insulated from its bearing so that, when the sprocket touches this roller, an electric circuit is completed which lights two lamps, one at each end of the furnace. One light is a signal for the operator that the sprocket is ready to be taken from the furnace and quenched. The light at the opposite end of the furnace is a signal at the loading position that another sprocket should be placed in the furnace.

A distance of 12 in., or two rollers, beyond the first insulated roller, another roller is insulated. If for any reason the operator fails to remove the sprocket from the furnace at the proper time, the sprocket will continue in the furnace and complete an electric circuit as soon as it touches the second insulated roller. When this circuit is completed a signal bell at the discharge end gives the signal to the operator that the sprocket has passed the proper position in the furnace for quenching, and that that particular sprocket should not be quenched.

The doors at each end of the furnace are mounted on vertical motor-driven screws. When charging the



▲ ▲ ▲
BACK view of re-
movable ribbon
resistor heating unit.
▼ ▼ ▼

top row of rollers, the sprocket is loaded in over the top of the charging door. When unloading the sprocket the opposite door is operated in the same manner, and the heated sprocket on the top row of rollers is pulled out over the top of the discharge door. The rollers on the top of the door thus act as charging and discharging platforms.

At the bottom of each door, and connected with it, is a second loading or discharging platform which moves up and down with the door. The sprockets are pushed into the furnace, pulled out of the furnace and placed in the quenching fixture by hand.

A cast alloy guard on the side walls of the furnace just above each set of rollers keeps the sprocket centrally located on the rollers, and thus prevents injury to the brick lining.

Rated 139 kw., this furnace is heated with removable ribbon resistor furnace units, as shown in detail. All heating units are easily removable through the side of the furnace and can be removed or replaced in case of emergency without shutting down the furnace. A few minutes suffices for removing or renewing a heating unit. From the appearance of the units after a year of operation, however, it looks as though they will last for a long time, probably seven or eight years, and the renewal feature will be useful only in an emergency. It is also necessary to remove the bottom row of units occasionally, to clean out the scale which accumulates in the space below them.

The heating units are divided into three automatically controlled zones. The first zone, at the in-going end, is rated 60 kw.; the second zone is rated 45 kw.; and the last, or out-going, zone is rated 34 kw. Each zone of heating units is connected to an automatic control panel and temperature-control instrument for complete automatic temperature regulation. The power is automatically fed to each section, depending upon the heating

requirements of the steel being fed through.

The furnace was designed to give a production of 610 lb. an hour net, and the estimated power consumption was 81 kwhr. an hour. It was esti-

mated that the furnace would give a net performance of 7½ lb. of steel heated for each kwhr. consumed.

It is interesting to note how close the test data come to the original engineering estimates. An increase in the estimated production has been obtained, because the heating and soaking time is not quite so long as originally seemed necessary.

Under test conditions the furnace is found capable of producing 886.4 lb. of sprockets an hour at 1650 deg., with a power consumption of 87 kwhr. an hour. This gives a net performance of 8.5 lb. heated for each kwhr. consumed, including heating-up time. This test is based on heating 8.58 sprockets an hour, weighing 80 lb. each. The furnace has been found to turn out an even higher tonnage, with a better power consumption, on a larger size sprocket.

Multiple Drilling and Tapping Machine with Hydraulic Feed

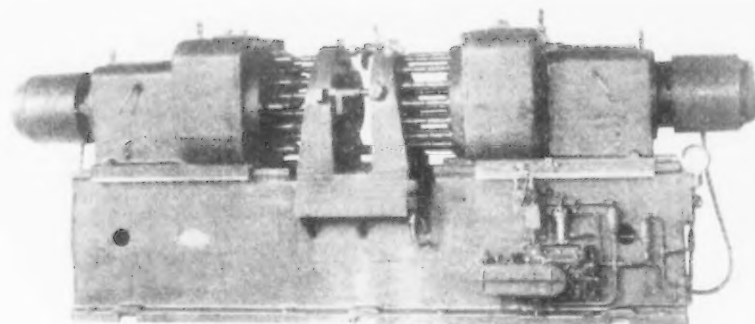
MULTIPLE-SPINDLE horizontal drilling and tapping machines equipped with Oilgear hydraulic feed have been brought out by the Rockford Drilling Machine Co., Rockford, Ill., a subsidiary of Berg-Warner Corp. Reduction of tap breakage to a minimum is a feature emphasized.

The machine will be made in several sizes, the particular unit illustrated having 19 spindles at one end and 17 at the other. After all holes have been drilled in a group of parts, the machine is then set for tapping and the parts are run through a second time and tapped. The holes may vary in size.

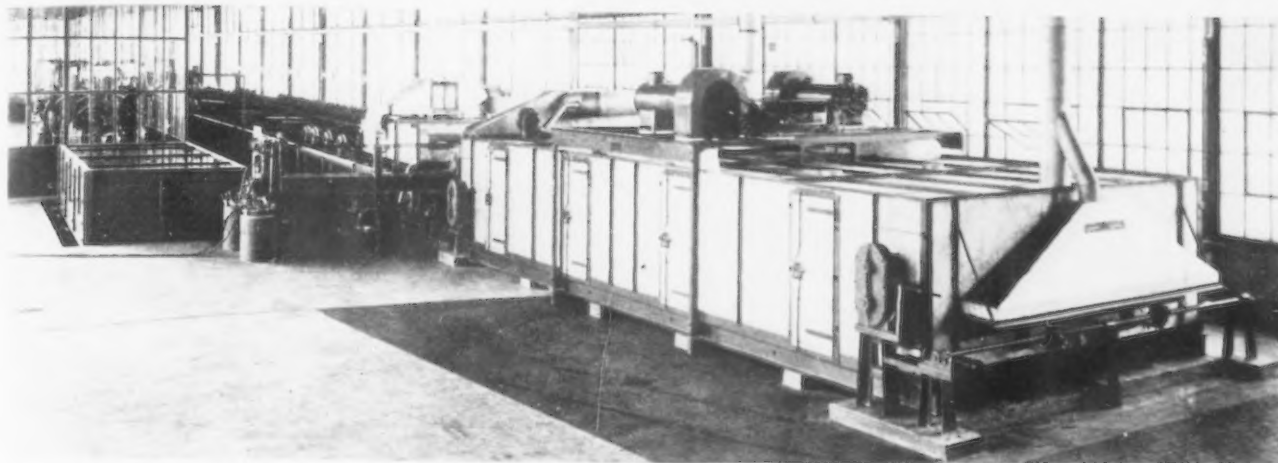
Each head is individually motor driven by a ball-bearing motor. The power is transmitted through reduction gearing to the main drive in the front compartment of the head which houses the spindle unit. Taper roller bearings which run in an oil bath are used throughout the head. The

spindles are contained in separate spindle units which fit into the front compartment of the drive heads proper, with the main drivers of these heads connecting with the main drivers of the spindle-units. This arrangement permits the interchangeability of spindle-units with varying numbers of spindles, or having spindles located on other centers. These spindles are mounted in ball bearings and are lubricated by force feed.

Both heads work in unison. They traverse rapidly to the work, then slow down to the correct feed, perform the drilling operation and return to the starting point and stop, ready for another cycle of operations. The machine functions in a similar manner when tapping. In the event a hole has not been drilled deep enough for tapping or if other undue resistance is encountered, the machine trips into reverse automatically and the taps withdraw, thus eliminating breakage.



The heads rapid traverse to the work, go into feed, return to the starting point and stop automatically.



Conduit Pipe Is Automatically Galvanized and Enameled

MODERN electric light and power transmission requires hundreds of millions of feet of iron and steel conduit pipe, of which 60 to 70 per cent is galvanized externally and enamel-lined, while the remaining 30 to 40 per cent is enameled both inside and outside. Conduit pipe, which ranges from $\frac{1}{2}$ in. to $4\frac{1}{2}$ in. in diameter in 10-ft. lengths, is subject to rigid specifications and tests by the Board of Fire Underwriters. Galvanized, enamel-lined pipe, for example, must stand the so-called copper sulphate immersion and bending tests for coating thickness, quality, adhesion and ductility as qualification for conditions of actual service.

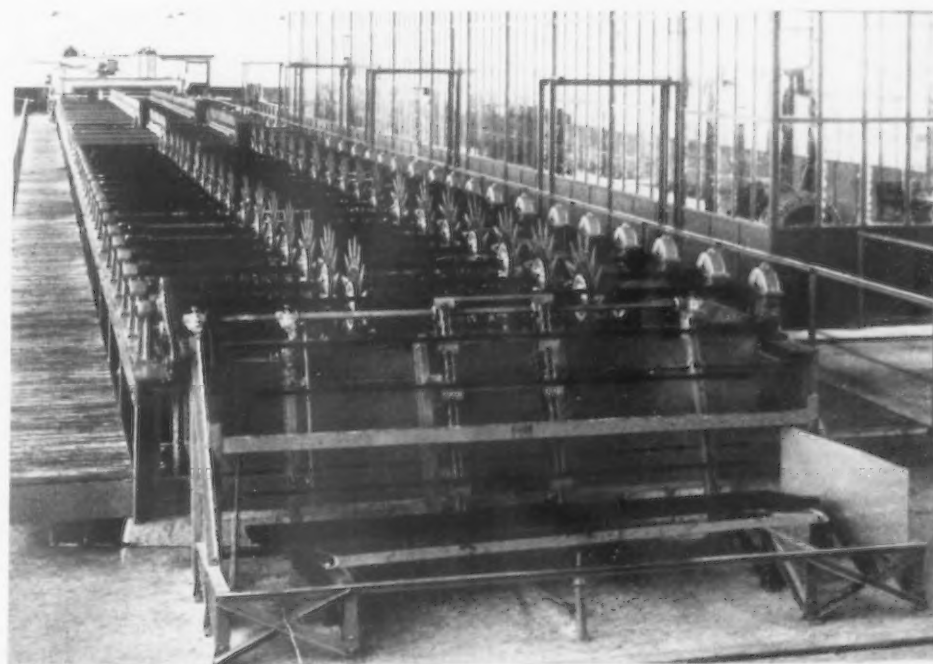
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THE automatic galvanizing and enamel-lining unit described in this article places the control of 17 operations in the hands of a single operator. When being run at capacity, this 207-ft. continuous unit galvanizes and lines with enamel 10 lengths of 10-ft. conduit pipe a minute.

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 For finishing the conduit pipe that it manufactures, Steel & Tubes, Inc., a subsidiary of the Republic Steel Corp., has installed at its Warren,

Ohio, plant what is believed to be the largest automatic cleaning, plating, enameling and baking machine in the world. This unit is 207 ft. long and 15 ft. wide, completely automatic, operated under the supervision of one man, and capable of producing each minute 10 lengths, or 100 ft. of conduit pipe, fully galvanized by electro-deposition of zinc on the outside, and having a baked enameled coating on the inside. Operating a double shift, a day's output is 142,000 ft., and the annual production of this machine is expected to reach 42,600,000 ft.

The designer, manufacturer and patentee of this equipment, the United States Galvanizing & Plating Equipment Corp., Brooklyn, states that the

FROM the carrier at the end of this 207-ft. unit, the sprockets, or spiders, which project on top pick up lengths of conduit pipe and carry them through the various operations. To the right is the glass enclosed generator room. Above is the oven at the end of the unit, where the enamel-lining is baked, the finished pipe being discharged at the end.



great reduction on labor requirement for this work is only one advantage, other equally important features being the production of uniform, test-proof, corrosion-preventing coatings, which, it claims, hand work could never do with the degree of efficiency this machine has attained, practically entire elimination of rejections and important savings in acids and chemicals. With testing samples taken at random, it is stated, the underwriters' inspectors seldom find a length of pipe coated by this machine which is not up to standard or does not merit the underwriters' label which each length must bear.

At the Warren plant the bulk of the

production is $\frac{1}{2}$, $\frac{3}{4}$ and 1 in. conduit, and the automatic machine has accordingly been arranged for these sizes. The machine is so designed that no adjustment whatever is required when changing from one size to another; in fact, all three sizes may be run at the same time.

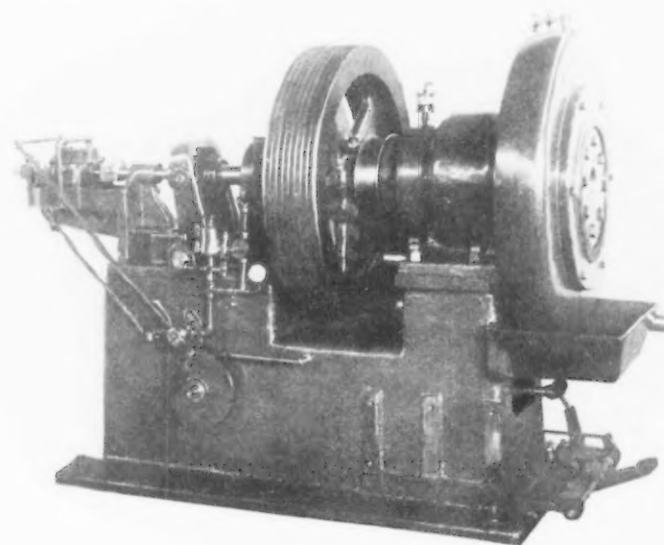
Such an automatic machine, it is stated, may be arranged for any required diameter pipe, processing treatment, sequence and time cycles, according to the character of pipe to be treated, as, for instance, for steel tubes, hot rolled iron pipe, etc. In fact, it is entirely feasible to build such equipment so as to handle conduit pipe of different basic materials,

such as iron and steel, in the automatic machine.

The Warren unit consists of a series of tanks each 12 ft. wide, of various lengths, placed end to end, over which a conveyor system has been arranged, and which is connected in direct line with an enameling coating unit and a baking oven. The pipe moves along the machine horizontally at all times, the only variation from this position being slight tilting at one end at certain points along the route, to aid in draining. Pipe is piled on a rack at the head of the machine, and by means of an automatic feed picks up the lengths individually and sends

(Continued on page 840)

Semi-Automatic Swaging Machine for Attaching Terminals to Cable



A MACHINE for automatically compressing the pocket end of copper terminals on to the ends of insulated flexible wire cables by the rotary swaging process has been built by the Langelier Mfg. Co., Providence, R. I.

This method compresses the tubular or pocket end of the terminal and the strands of wire into a solid mass; it makes a very strong connection and is much faster than the soldering method previously employed. Two types of terminals can be applied: One is a plain cylindrical copper tube, the blade end of the terminal being formed after the swaging operation is completed. In the other type, the blade of the terminal is completely formed before being swaged on to the cable. Machine equipment includes dies and spring collets for swaging 11 sizes of terminals.

The operator slips the pocket end of the terminal over the end of the cable and places the terminal between the open dies. He then locates the terminal by inserting the blade end into a slotted stationary mandrel located at the rear of the dies. Tripping the foot pedal then starts the machine on its swaging cycle. After the swaging, the operator removes the terminal from the machine, and goes through the same procedure to swage

the terminal on the other end of the cable.

The machine can be set to stop at the completion of its cycle or to run continuously. The locating mandrel prevents the terminal from turning or being twisted while being swaged. In the case of tubular type terminals, a spring collet that is opened and closed by compressed air is used. Collets for the tubular terminals and the slotted adapters for the blade type are interchangeable in the locating mandrel. The locating mandrel is held from turning by a key in the bearing at the rear of the machine, and is connected to the piston rod of the compressed air cylinder at the rear end of the machine.

The special swaging head employed has a mechanism inside the swaging spindle for opening the dies a sufficient amount to permit inserting the largest terminal of the blade type between the dies while they are revolving.

The main spindle of the machine is of large diameter and runs in bronze bearings, one on each side of the flywheel. The flywheel is grooved for eight Gilmer V-ropes and is driven by a 15-hp., 1200-r.p.m. motor which is mounted on a bracket on the base of the machine. An adjustable motor

base provides for adjusting the V-ropes to proper driving tension. Ample lubrication of running parts in the swaging head is provided by a pump which draws oil from the tank cast in the base. Oil guards are regularly furnished with the machine.

Two speeds are provided, one to give an output of nine a minute for the small terminals, and one of six a minute for the large terminals. The machine occupies floor space of 5 x 8 ft., and stands 5 ft. high overall. It weighs approximately 8000 lb.

1929 Screw Machine Products Worth \$103,182,000

WASHINGTON, Feb. 27.—Total sales of screw machine products and wood screws by manufacturers in 1929 were valued at \$103,182,000, of which 79.9 per cent, or \$82,476,000 was made to industrial consumers, according to the Bureau of the Census. The remaining sales were made as follows: 17.8 per cent, or \$18,297,000, to wholesalers and 2.3 per cent, or \$2,409,000, to retailers. Of the total sales, 8.1 per cent or \$8,385,000, was made through manufacturers' agents, selling agents, brokers and commission houses.

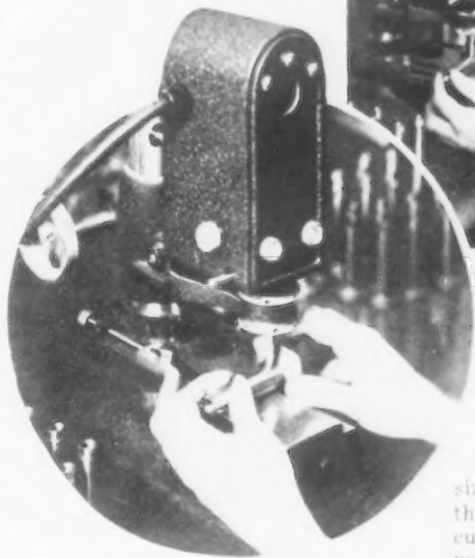
Electric Gage with Flashing Signals Permits Rapid Inspection

INCREASED accuracy in testing production work and a substantial shortening of the time required for inspection have been achieved at the Reo Motor Car Co., Lansing, Mich., by the use of an electric gage of unique design. With no wearing parts except the anvils, this gage gives readings to 0.00001 in. and is constructed and operated so as practically to eliminate dependence upon human judgment.

The operator's duties are limited to inserting the work between the anvils and removing it. If it is satisfactory, an amber light at the top center of the gage flashes; if undersize, a green light appears at the left top; if oversize, a red light at the right top is a warning that further processing is necessary.

Signals flash instantly, thereby doing away with any hesitation on the operator's part. An indicating lever travels between two contact points, which are adjustable from 0.00002 in. to 0.002 in. in tolerance by means of "scissors" in the rear of the gage. Parallel spring-steel reeds transmit motion to the indicating lever which is attached to them. The reeds, in turn are connected to two blocks, the right-hand block being attached to the frame and the left-hand one being tied to the rigid block by two other spring-steel reeds.

The movable block is held down against the plunger of the upper anvil by a fine coil spring. When work is



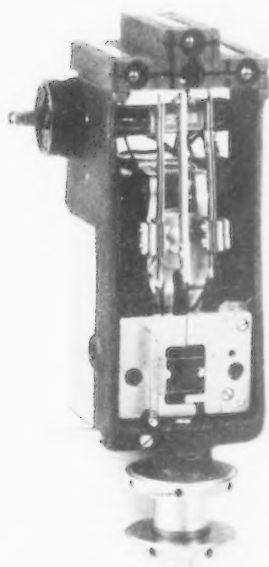
put under the anvil, the block is forced upward, distorting the reeds which support the indicating lever and causing the lever to move from side to side. If the work on the anvil is undersize, the lever rests against the left-hand contact, thereby flashing a green light. Should the work be correct, the lever will move to a vertical position, the green light going out and the center, or amber, light appearing. If the work is over-



FAST gaging is possible because the signals flash instantly, thereby doing away with any hesitation on the operator's part.

size, the lever travels to the right, the red light flashing. Alternating current coming into the plant at 110 volts is stepped down to 27 volts a. c. and further converted to 18 volts direct current to operate the gage.

The lower anvil of the gage is a bar of steel with crosspiece of tungsten carbide inserted directly below the diamond tip of the upper anvil, a construction assuring long service between resettings. The operating arm is of alloy steel and the base is made of cast iron. The gage is manufactured by the Sheffield Machine & Tool Co., Dayton, Ohio, in several sizes to accommodate various types of work.



Electric gage with cover removed to show arrangement of indicating unit.

Compact Hoist for Low Headroom

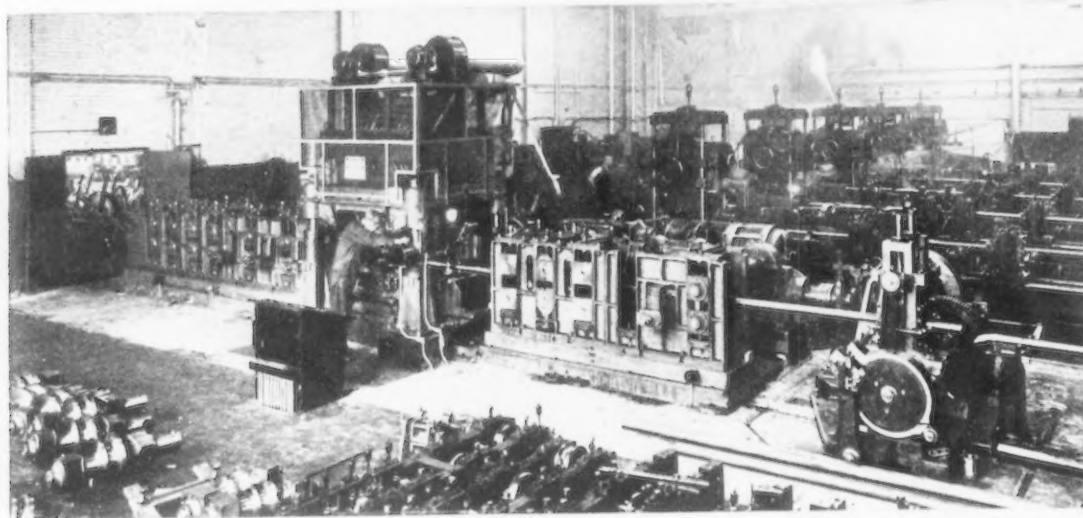
A NEW hoist is being put out by the Euclid Crane & Hoist Co., Euclid, Ohio, known as Type 12. Of extremely compact, fully inclosed design, it is planned to meet the increasing need for low headroom, with no sacrifice of speed. It is made in sizes of 1, 1½ and 2 tons.

With every shaft rotating on Hyatt heavy-duty, heat-treated roller bearings with solid races, the Type 12 is said to be featured by endurance and smoothness of operation. It carries the load throughout on steel and is equipped with a fully inclosed hook block, thus meeting the safety requirements of all States.

A new positive, automatic load brake is free from frictional resistance while hoisting, yet the load is

under positive control at all times. The brake automatically sets when the hoisting motor is stopped. The load can be lowered only by reversing the motor. A new type of motor brake is provided which stops the motor instantly when controller is thrown into neutral position. Hoist is driven by an unusually large heavy-duty Westinghouse motor.

Although 25 per cent is the usual overload guarantee, the new Euclid hoist has been tested under all kinds of conditions with 100 per cent overload. The trolley is designed for easy installation of hoist, either parallel with or at right angles to the I-beam, a desirable feature where clearance as well as low headroom must be taken into account.



FLAT steel stock is formed cold into a tube, which passes under the electrodes, and is welded without the addition of welding material at the rate of about 80 ft. a min. Tubing up to 1/4 in. thick and 5 in. in diameter is produced.

New Welding Unit Increases Range of Johnson Process Steel Tubing

COMPLETION of a new electric welding unit which greatly increases the range of steel tubing produced by the Johnson process has been announced by Steel & Tubes, Inc., Cleveland, a subsidiary of Republic Steel Corp.

After several years of experimental work, a machine has been developed which will weld tubing of much heavier wall thickness than has heretofore been possible, and up to 5 in. in diameter. Sizes formerly directly welded in this manner ranged from No. 26 to No. 11 gage. The new unit electrically welds tubing up to 1/4 in. in thickness, increasing the wall range to No. 3 gage, all intermediate gages being included.

Large coils of flat steel stock are fed into the forming rolls to be formed cold into a tube. This passes directly under the electrodes where fusion takes place without the addition of foreign metal at a speed of approximately 80 ft. of tubing a minute. The welding burr is eliminated and the weld is almost imperceptible. The process is practically continuous, and is said to be not only much faster but to produce a stronger and better appearing finished product. Welding current for the machine is drawn from the lines at 2300 volts. When operated at full capacity, over 1200 kw. of electrical power is concentrated continuously in a spot no larger than the eraser on an ordinary pencil.

Continuous testing takes place, samples being expanded until the wall fractures. This fracture must occur at some point other than the weld to allow the welding machine to continue in production. Ductility and hardness tests are made to assure correct temper.

The new machine permits unusual uniformity of wall thickness, a tol-

erance of 0.004 to 0.008 in., plus or minus, being met, and in some special cases even less, it is stated. The Johnson electric welding process has recently been extended to high-carbon

structural tubing by Steel & Tubes, Inc. The company's electrically welded tubing includes round, square, rectangular, oval and ornamental tubing in all sizes from 3/16 to 5 in., outside diameter, as well as bent and formed tubing and fabricated parts. Threadless conduit known as Steel-tubes electrical metallic tubing is also produced. Adaptation of the Johnson patents to the production of steel pipe was described in THE IRON AGE of Aug. 14, 1930, page 422.

Automatic Shape Welder Saves Time by Eliminating Resettings

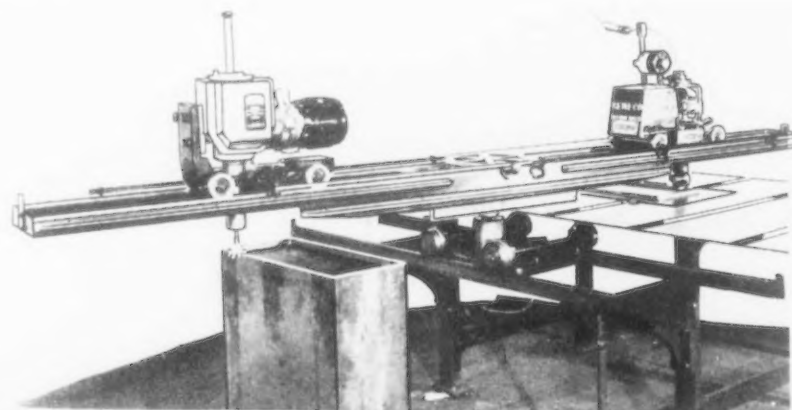
ASERIES of machines designed to guide electric arc welding heads automatically over any regular or irregular line has been brought out by the General Welding & Equipment Co., 70 Lansdowne Street, Boston. The machines follow the line exactly, operate at a uniform speed, and permit completing the work at one setting.

The illustration shows one of the machines equipped with a Lincoln Electric Co. automatic "Electric Tornado" head for welding heads in tanks.

Formerly, these tanks were welded

by means of straight line machines, which necessitated four different settings, one for welding each of the four sides. The total time required was 9 min.; of this, 6 min. was consumed in resettings. In doing the same work at one setting, the shape welding machine effects a considerable saving of time.

Four of these shape welding machines have been installed recently to weld about 2500 tanks per week. With 1/16-in. stock or 3/8-in. at the top edge, the speed of welding is 25 linear inches a minute.



Composite Demand Line for Steel Declines Further

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

THE composite demand line for steel declined in January, falling to a new low level for this recession. It is now the lowest since January, 1922, and nearly down to the bottom reached in March, 1921. This means that the activity in the chief steel consuming industries, allowing for seasonal variation, has continued to recede.

Declines occurred in railroad freight traffic, automobile production, mining activity, agricultural purchasing power, general manufacturing activity (excluding iron and steel and automobiles), and exports. Machine tool orders reacted somewhat. There were no increases in any of the factors, but our adjusted index of building activity remained unchanged at bottom levels.

On the other hand, our adjusted index of steel ingot production rose in January, the gain being distinctly more than usual for the season. Even in May, 1921, which month was in many respects similar to January, 1931, the temporary spurt in steel production was justified by a rise in the composite demand line and by the fact that production had fallen well below the indicated level of demand. At that time, railroad freight traffic, building activity and manufacturing were all on the upgrade.

Thus the apparent maladjustment between steel production and the indicated current requirements for steel continues to exist and actually increased in January. It will be interesting to see if our measurements have been vitiated to any extent by the development of new factors affecting steel consumption, or if the indicated overproduction is real. We have suggested in the past the possibility that the demand for pipe line steel may not be adequately reflected in our index. There is a possibility that the downward trend in railroad freight traffic in recent years may not be adequately allowed for. Be that as it may, it is at least certain that the January increase in steel production was not justified by activity in the chief consuming lines.

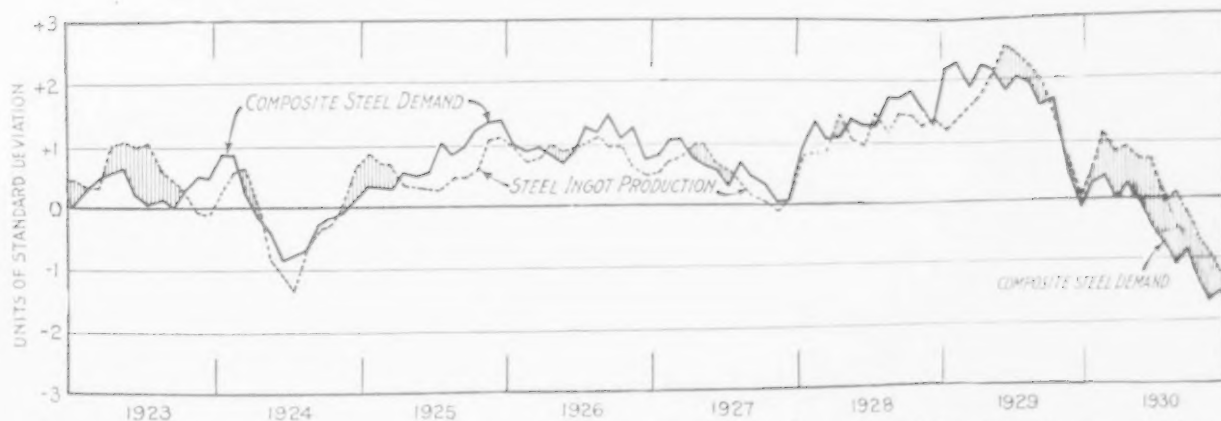
As to the outlook, a consideration of railroad business is not encouraging. The tonnage hauled

in January showed a less than seasonal gain. Gross revenues were at least 17 per cent below a year ago, while net operating income declined by more than twice that percentage. *Railway Age* reports that no orders for freight cars or passenger cars were placed, and certainly the surplus of freight cars is large. Locomotive orders declined and were the lowest for the month of January in any recent year except 1922 and 1928. In general, the outlook for business, including agriculture, is not sufficiently encouraging to lead us to expect as much as the usual seasonal gain in freight traffic.

Building activity continues to drag bottom and showed no improvement in January. Bookings of structural steel touched a new low in the current recession, and, while weekly trade reports suggest that January bookings declined somewhat less than usual from December, the weekly average in February apparently has been less than in January, which is unusual. The present condition of rentals and the mortgage-bond market is not suggestive of early improvement in commercial building operations.

It is becoming clearer than ever that the automobile industry is in the position of awaiting a recovery in business rather than leading such a recovery. The present condition of consumer purchasing power greatly limits the market for these semi-luxuries. January registrations appear to have been relatively low. The sales of the General Motors Corp., made a very poor showing, sales to consumers increasing much less than usual, while dealer inventories have apparently begun to accumulate somewhat more than is desirable. January automobile production was much below estimates.

A close study of all available business measurements gives one the impression that the business recession has nearly reached bottom levels, but that no sustained upturn is yet in sight. This suggests that the demand for steel (aside from the possible stimulation of road construction and other public works) will continue dull for some months and hardly be up to the normal seasonal expectations.



The spread between steel production and demand has become greater. Recovery will be definitely assured when demand rises above output.

W. W. MAUVIN
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

How to Become Poor

PROSPERITY is a function of the accumulation of wealth. The accumulation of wealth is measured by the difference between production and consumption. Every person knows the truth of these simple principles in respect to himself. They are equally true of the aggregate of persons who constitute a nation.

There are certain illusory phenomena that appear to demonstrate the contrary. After the destruction of a city by fire and the collection of the insurance money the spending of it produces a local activity, which is mistaken for prosperity, but is only a mirage. The fact remains that wealth has been destroyed.

For the reasons that some persons are thrifty and some unthrifty, some of superior intelligence and some inferior, some fortunate and some unfortunate, there are inequalities in the division of wealth. For the same reasons all social plans to produce more equality in division, even to abolish division, are destructive of wealth itself and consequently impairing of prosperity. Crippling of the proprietary does not help the property-less. To them a national wealth is most important, even if their percentage possession of it be relatively small. One share in a company of great wealth may yield larger dividends than 100 shares in a small one.

With these principles in mind we may point out more clearly some of the ways to become nationally poor. We shall think only of some of our American experiences during the last dozen years.

In the first place we lost about $1\frac{1}{2}$ billion dollars in Governmental operation of our railroads. Then three billions in building ships, begun as a war measure, but prolonged unnecessarily for several years. Another aftermath of the war was Muscle Shoals, which is still with us and looks like an investment of 200 millions by the time everything is completed, which then in all probability will be an economic loss.

We may overlook the annual deficits in postal service and the enhanced cost of naval construction by the Government in comparison with private construction (vide battleship Connecticut vs. Louisiana) as relatively minor matters. Not so, however, with inland waterways, and much of our river and harbor improvement and public buildings. These are only the ordinary Governmental wastes and are rather different from the great adventures and *douceurs*.

Under the latter head we are committed to about a half a billion in trying to maintain prices for agricultural products, chiefly wheat, which is probably

going to be lost, and about $3\frac{1}{2}$ billions for bonus to the veterans. The latter was done in 1924. The recent action of Congress does not increase that obligation, but only embarrasses the Treasury in meeting it and harms the veterans in leading them to convert an endowment into immediate consumption.

We talk so glibly of millions and billions because this is so immense a country. With a national income of something like 83 billions in 1929, which in 1930 probably has been reduced only to 70-75, we think in big terms. Otherwise we should not be so able to squander billions, without being immediately conscious of the adverse effects. Before the war we used to figure that about 15 per cent of our national income was saved and went into houses and railroads and other forms of wealth that contributed to the comfort of the people. During the last decade our percentage of saving has been less. It is conceivable that by an increase of pensions, bonuses, *douceurs* and speculations our savings might be reduced to zero, and then we should have a cessation of house building, water supply, increased transportation facilities and the other things that are necessary for an increasing population.

The legislators who so blithely make appropriations of millions and billions ought to give thought to such things. The bills that they incur can be met by taxation. Even if the normal national surplus should be extinguished people might be caused to curtail their food, fuel and clothing. Let it be remembered, however, that every dollar abstracted by taxation is a dollar taken from something else, and every dollar abstracted from the accumulation of wealth is to the detriment of the commonweal.

Is Labor Conscription the Answer?

ONE of the anomalies of the existing unemployment situation in America, Great Britain and Germany alike is that millions of men in each of those countries have no work although each country has much work that ought to be done. At the same time there is a plethora of raw materials available at low prices and an abundance of credit at low rates. Antithetically, Russia with no credit worth mentioning not only has no unemployment but is experiencing a shortage of labor and is striving to produce more raw material. We simply state this paradox.

In Great Britain the Liberal Party has recently adopted a resolution calling upon the Government to formulate and to present to Parliament an extensive

policy for utilizing the labor of those out of work in useful and essential schemes of national development. Among the schemes specifically mentioned are regional and town planning, housing and slum clearance, improvement in rail, road and canal transportation, extension of traffic facilities in the great cities, especially London, land settlement, reclamation and drainage of lands, development of electric and telephone systems and other work for improving public utilities.

This is an intelligent expression of needs in respect to Great Britain, to which some others might be added, such as modernization of industrial plant. Anyhow, Great Britain has a lot of work that ought to be done, and in different degrees and ways so have America and Germany. How then is it to be started and how is it to be done?

Is it to be done under Governmental inspiration and management with all the wastes that are consequential upon such undertakings?

Is it to be done with labor upon labor's own terms, which private employers refuse to grant, while the Government as employer yields without argument? Which means, of course, that the taxpayer is required collectively to stand a bill that individually he is unwilling to shoulder.

In an address at the recent annual meeting of the American Institute of Electrical Engineers, William S. Lee, its president, remarked: "A private corporation would have built the Muscle Shoals plant for less than half what it cost the United States, and there is no doubt that it has been a colossal blunder. A review of some of the estimates of cost for Muscle Shoals is startlingly revealing. The development was estimated in 1920 to cost about \$25,000,000. Within less than a year this estimate was changed to \$50,000,000; now the plant is partially completed and the cost is approximately \$47,000,000 and about half of the generating and hydraulic equipment for the powerhouse remains to be completed."

Mr. Lee expressed the fear that the next decade would see even greater blunders if some of the projects now under way are fulfilled. The tremendous project started at Hoover Dam has no tangible evidence of any definite policy or effective contracts. Every engineer knows that the Government cost of constructing the Long Sault plant on the St. Lawrence River will be two or more times what private costs would be; and that it is impossible to transmit power from the St. Lawrence and make it available to the City of New York in competition with modern local steam plants.

Does the movement toward Governmental ownership mean anything but the promotion of contentment by time-serving? How much of that idea is entering into the present relief of unemployment wherein municipalities are paying common labor \$4 per day to do the work that private employers are hiring at \$3, a party wall along the roadside being perhaps the dividing line.

Public employment as a method of getting around the buyers' strike is not economically beneficial in the broad sense. It goes part way toward the dole.

Lord Dawson of Penn relates the anecdote of a yokel in Great Britain who rejected an offer of work at a few shillings per week more than his dole for the reason that he desired to preserve his independence. Even in this country the bestowers of charity are reporting some difficulty in getting their recipients back to work when work is available. It appears that there are a good many choosers.

The danger of these temporizing half-measures, unavoidable though they may be in some cases, is that they move us toward the communism of Soviet Russia, which practically is not the ideal communism but rather is the despotic conscription of labor.

Automobile Production Prospects

OPINIONS recently held as to the future of automobile production, say in the next year or two, have varied widely. Some have thought there would be such recovery as to approach the 1929 rate, while others have thought that past production was purely historical. The truth usually lies between the extremes and it may be well to present some computations based on the long-range growth.

There have been times when computations were made to show that a shortage was accumulating, but at other times, when production increased sharply, there has been little disposition to compute any excess. Much publicity has been given to the fact that registrations in many States decreased last year, but that is really not damaging testimony as to the future. Total registration increased 0.8 per cent, losses in some States being more than offset by increases in others. The important fact to be considered is that the increase in registrations had been slowing down. From 1923 to 1926, registrations of cars and trucks in the United States gained by an average of 13.4 per cent a year, but from 1926 to 1929 the annual increase averaged only 6.4 per cent, and that despite the very heavy production of 1929. From that viewpoint the showing of 1930 registrations does not appear so poor. The total was approximately 26,718,000, made up of 23,200,000 cars and 3,518,000 trucks.

As to the general rise in production, the period from 1923 to 1928 may be considered typical. Both were record years. Two of the intermediate years, 1924 and 1927, were off years, while the other two made new records. The increase in the production of cars and trucks in the United States and Canada from 1923 to 1928 was 10.1 per cent, or about 2 per cent a year. Obviously when production rose 22 per cent from 1928 to 1929 there was something unusual.

If production had increased 2 per cent a year after 1928, 1929 would have shown a total of 4,700,000, while actual production was 5,621,715, and 1930 would have shown 4,800,000, while output was 3,509,169.

On the basis of the former rate of increase the excess of 1929 was offset in 1930, with about 400,000 to spare, which could for convenience be called a deficit. Of course, allowance should be made for times not being as good as in 1928, disregarding the good times of 1929, for the computation has taken care of that. What allowance should be made is problematical, but some measure can be supplied. Add another

2 per cent for 1931 and one has 4,900,000, which, plus 400,000, would make 5,300,000 for this year. No one expects anything like so large production, and the amount by which the year runs under this number will be assignable to the change in business conditions as compared with 1928.

The automobile industry has been making a sharp recovery from last November, when production was very low. Output in that month was not so low, however, as to induce what might be called an automatic recovery, for there have been lower months in recent years—December, 1929, and November and December, 1927. The recovery must be a reflection of improving conditions, for December showed a 14 per cent gain and January a 10 per cent additional gain, while there have been further gains since. Presumably the period of increase will be longer than usual. Peak months of production have fallen as follows: 1923, May; 1924, March; 1925, October (the spring peak was in April); 1926, April; 1927, May; 1928, May; 1929, April; 1930, April. Thus April has had the call, but to make a fine distinction, when April was the high month May generally did better than March, whereby one may say the average peak has been in the latter part of April. This year May could readily be suggested, or even the forepart of June.

Coal Throws Light on Business

BITUMINOUS coal production furnishes one of the indexes to general trade activity. To throw light on recent conditions with a minimum of figures, a convenient comparison is between the five months, October to February inclusive, and the preceding five months, May to September inclusive, for the later period embraces almost the entire domestic demand, outside of that in the Northwest, largely taken care of by Lake shipments during the navigation season.

Production in the two periods has been as follows, with percentage increases from one period to the next:

Bituminous Coal Production (Thousands of Net Tons)			
	Five Months Through September	Five Months Beginning October	Per Cent Increase
1925	202,787	255,311	25.8
1926	217,980	279,877	28.4
1927	188,548	212,356	12.6
1928	194,373	242,582	24.8
1929	211,087	233,059	10.4
1930	178,676	192,108	7.5

Figures for the past so well represent business conditions as they are remembered and as they are measured by other data that there can be confidence in the recent showing. There were three cases in which business conditions were average and did not change materially, and they all showed 25 to 28 per cent increase from the one five-month period to the next, these periods beginning in 1925, 1926 and 1928 respectively and ending in the succeeding years. There was a general decrease in 1928, when there was more business activity, and that may be ascribed to greater economy in the use of coal and to greater consumption of oil and gas. In 1927 there was an exception, the five months after Oct. 1 having shown only 12.6 per cent increase over the preceding five months, a fact that may be ascribed to mild depression.

The period of five months through September, 1929, was one of great trade activity and coal production was heavy, while the next five months included a slump in trade. The smallness of the increase, 10.4 per cent against the usual 25 to 28 per cent, may be ascribed to that. It is unlikely consumption of domestic coal suffered materially.

Between the two latest five-month periods there was only a 7.5 per cent difference. Three factors helped make the increase so small. There was declining industrial activity in the last three months of last year, as compared with the period May to September inclusive; there was more economizing by householders, and the weather was very mild. There was a complete absence of really severe cold snaps such as occur more than once in the typical winter, and average temperatures were about normal.

Correspondence

Humanity During a Depression

To the Editor: Having read George F. Summers' letter in a recent issue of THE IRON AGE, I offer a few comments on what he had to say.

First of all, his viewpoint is warped if he thinks that spending by the "common" people (whether buying on credit or paying cash) had anything to do with causing the present depression. But such spending has a good deal to do with prosperity, as every one knows.

How many people does Mr. Summers know who are in debt and make no effort to get out, or are indifferent about it? We may be sure they are few. Now I shall give him an answer to better than half of his letter in one sentence:

Since the people are in debt and don't care whether they get out or not; and since they have no money anyway; since buying stimulates making, and making makes jobs; and since even instalment buying in the absence of ready cash is necessary to move goods that are made; since the goods that are already made must move before other goods can be made; since it will take four years to beat, pound, knock or hammer it into the heads of the people that, "if they are to have jobs, they must stop buying on the instalment plan" and let the warehouses fill up to the roofs with goods, it would seem to me that the "good people in the United States who believe that the old principles of thrift and saving are still working to keep business alive" will wake up some fine day to find that goods made means goods sold (on the instalment plan or otherwise), and if the goods are not sold the processes of making must stop.

In conclusion, I want seriously to comment on the unemployment fund which was recently raised and distributed in Davenport and Bettendorf jointly. I suppose this fund was what Mr. Summers had in mind when he denied that it went to buy milk and pay grocery bills. It is safe to say that 98c. of every dollar subscribed went to pay for actual necessities of life. I know, and Mr. Summers must know, that this fund fed hundreds of hungry men, women and children. It warmed their bodies and cheered their hearts; it dried the tears of children; an ache in the hearts of mothers was replaced with a little joy; and from men's lips it drove a curse for conditions over which they could have no control and for which they were not responsible. It brought home to those deprived the fact that few men's hearts are made of stone.

Bettendorf, Iowa

C. W. VEACH.

Pig Iron Production Gains 10 Per Cent in February

A GAIN of 10 per cent in pig iron production in February and a further slight increase in ingot output during the past week are reassuring factors in the iron and steel industry.

Irregularities in the flow of orders, always more noticeable in a period of subnormal activity, continue to obscure the trend of business, particularly for manufacturers of a single product or a narrow range of products. Nevertheless, viewed as a whole, the impressive feature of the market is not the temporary setbacks experienced by some producers or the gains shown by others, but the sustained, though gradual, expansion in the total consumption of metal.

RAW steel output has risen at Cleveland, Chicago and in the Wheeling district and has receded in the Valleys and at Buffalo. The average for the country at large is estimated at 53 per cent, compared with 52 per cent a week ago. Further gains in the general average are looked for during the current month, although no attempt is being made to forecast the rate of increase or the proportion of the increment that will be contributed by specific products.

WITH mill operations in close step with consumption, backlogs have lost much of their significance. It is entirely possible that the unfilled tonnage of the Steel Corporation and other leading producers was reduced in February, but the important consideration from the standpoint of production is the flow of shipping orders rather than the piling up of contract obligations. Forward commitments, under present conditions, are limited mainly to the railroads and other larger consumers. Rail and tin plate contracting was largely completed in January and mill bookings since then have been predominantly in smaller lots, almost invariably for quick shipment. This class of business is becoming more and more diversified, with orders becoming more frequent if not larger individually.

Miscellaneous buyers are not likely to depart from this hand-to-mouth policy until forced to do so by price considerations or an extension of mill deliveries. The next wave of forward commitments will probably come mainly as the result of the placing of line pipe and structural steel, large tonnages of which are pending, and more liberal contracting for automobile steels as motor car output expands.

PIG iron production in February was 1,706,621 tons, or 60,950 tons a day, compared with 1,714,266 tons, or 55,299 tons a day. On a daily basis there was a gain of 5651 tons, or 10.2 per cent. While the upturn begun in January was continued, output was the

▲ ▲ ▲
**INGOT Output Continues
Gradual Advance—Automobile, Pipe Line and Structural
Business Looms Larger—Strip
Prices Advanced**
▼ ▼ ▼

smallest for any February since 1922. Blast furnaces operating on March 1 numbered 108 as against 102 on Feb. 1 and 95 on Jan. 1.

Automobile production is responding more rapidly to rising spring demands and present schedules indicate a March output for this country and Canada of 275,000 to 300,000 cars. Makers of steel sheets, strips and bars are receiving increasingly generous specifications from the motor car builders. Shipping orders received by one large sheet producer last week were the best since October.

PPIPE line business looms larger with the appearance of substantial additions to the heavy tonnage now outstanding. The Sinclair Consolidated Oil Corp. is in the market for 35,000 tons of 12-in. pipe to extend from Rusk County, Tex., to the company's Oklahoma oil properties. The Columbia Gas & Electric Corp. is inquiring for 22,000 tons for a 150-mile section of a line from Kentucky to Baltimore. The National Tube Co. has booked 9000 tons of pipe from the Trojan Engineering Corp. and 4000 tons from the Consolidated Gas Co. of New York.

Structural steel awards, at 59,000 tons, are large, comparing with 55,000 tons in the previous week. Of the week's total, 23,000 tons was accounted for by New Jersey State bridge work and 20,000 tons by a New York life insurance building. New projects, at 136,000 tons, are the largest in more than a year. Most of this amount is represented by 110,000 tons for a group of buildings to be erected by the Metropolitan Square Corp., New York. Chicago has voted \$55,000,000 toward civic improvements which will require several hundred thousand tons.

TIN mill operations are holding at 75 per cent and open weather has accelerated rail releases, rail output at Chicago having risen to 55 per cent of capacity. The Western Pacific has bought 10,350 tons of rails from the Colorado mill. The Virginian is in the market for 4000 tons.

Leading makers of strip steel have announced advances of \$1 a ton on hot-rolled material and \$2 on cold-rolled to apply on second quarter business. Present prices on sheets have been reaffirmed for next quarter by at least one important producer. Bolt, nut and rivet quotations also will remain unchanged.

Imported bars and bar-size shapes have become a serious competitive factor in some seaboard centers.

Heavy melting scrap is 25c. a ton lower at Detroit and is weaker at Pittsburgh and St. Louis. Prices have a stronger tone at Chicago and Buffalo.

THE IRON AGE composite prices are unchanged, finished steel at 2.142c. a lb., pig iron at \$15.71 a ton and heavy melting scrap at \$11.17 a ton.

PITTSBURGH Steel Specifications Barely Holding Their Own—Seasonal Demands Slow in Maturing

PITTSBURGH, March 3.—The recent improved demand for finished steel products seems to have subsided in the last week. Specifications have barely held their own in some lines and have fallen off slightly in others. Orders for reinforcing bars, structural material and plates are not yet reflecting the approach of open weather. It may be another two weeks before the motor car builders have a line on their April production and, if further advances in production seem warranted, the steel industry can expect another slight acceleration in buying such as was experienced in February.

No particular change is evidenced in the other principal consuming lines. Releases on rails and accessories by the railroads are coming in fair volume, but seasonal improvement is slow. Jobbers in the West and South are ordering out barbed wire and fencing, but in a very restricted manner. Makers of electric refrigerators, office furniture and equipment, steel barrels and drums and road machinery are taking more sheets, but releases are for small tonnages and for rush shipment. Demand for tin plate is holding up. Shipments of line pipe are gradually increasing, and several large orders are expected to come to nearby mills this month which will build up backlogs.

While steel ingot production in the Pittsburgh and Wheeling district is holding its own, curtailment is reported in the Valleys. Youngstown mills have dropped down to about 47 per cent, after having bettered 50 per cent for a couple of weeks. Pittsburgh capacity is engaged at slightly less than 50 per cent, although a steel company blast furnace has been blown in and no immediate curtailment is in sight. The Wheeling district is producing ingots at about 60 per cent of capacity.

Finishing mill production has not changed materially, although strip output has gained a few points. Improved specifications for sheets have not brought much increase in production, with the industry running at about 45 per cent. Tin plate schedules are holding their own at 75 per cent, with the leading interest engaged at slightly under 70 per cent.

Little change has occurred in the market for raw materials, with scrap weaker, although unchanged in quoted prices.

Pig Iron

February shipments of several sellers ran slightly ahead of those of

Steel orders and specifications at dead level in past week.

Prospects of seasonal improvement still hold good, but are maturing very slowly.

Pittsburgh district operating rate slightly under 50 per cent; Valleys drop down to 47 per cent; Wheeling district at 60 per cent.

Tin plate mills at best operation, averaging about 75 per cent.

Scrap market slightly weaker in tone, but with prices unchanged.

January, but no improvement has taken place in the last week in either sales or releases. Orders are principally for small lots, and the larger consumers are showing no interest in the market. Prices are nominal at \$16.50, Valley furnace, for foundry iron, and \$17 for Bessemer and malleable. No sales of basic have been reported to clarify the price on this grade.

Prices per gross ton, f.o.b. Valley furnace:	
Basic	\$16.50
Bessemer	17.00
Gray forge	16.00
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	17.00
Low phosphorus, copper treated	\$26.66 in 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	\$17.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.15.

Semi-Finished Steel

While shipments during February are estimated to have been about 10 per cent ahead of those of the previous month, tonnage moving currently amounts to scarcely more than half the capacity requirements of leading consumers. No announcement has been made regarding second quarter quotations, and a change from the prevailing figure of \$30, Pittsburgh or Youngstown, for billets, slabs and sheet bars is not expected. Forging billets are quoted at \$36, Pittsburgh, and specifications are gaining moderately. Shipments of wire rods to bolt and nut makers are slightly heavier. The price is hold-

ing at \$35, Pittsburgh, and little interest in second quarter needs is reported.

Rails and Track Accessories

Specifications for track supplies are reaching the mills in fair volume, considering the restricted buying policies of the railroads. As might be expected at the beginning of a month, releases have increased in the last day or two and mill operations will probably show improvement this month over February. Rolling orders for rails are still rather disappointing, but the local mill will increase its output considerably before the end of the month.

Bars, Plates and Shapes

Specifications for the heavy hot-rolled products have not yet reflected the approach of spring building activity, and little change in demand during the last week is reported. Reinforcing bars are moving in somewhat better volume, but structural material is just about holding its own. New inquiry continues to increase, and early action is expected on several large reinforcing and structural jobs which have been pending for some time. Barge builders in the district are increasing their steel needs, but Government work is still predominant in prospective business. Opening of bids on two car ferries for the United States Engineer at Memphis, Tenn., has been postponed until March 16. Fifteen hundred tons of steel will be required. Otherwise plate business is slack, although the railroad car builders have yet to order out considerable tonnage for orders placed quite a while ago. Fabricators of steel tanks report no particular improvement in business. Bar tonnage is going to the automobile industry in gradually increasing volume, but parts makers are making a relatively better showing than the automobile companies themselves.

Official announcement of second quarter prices is still lacking, but in a few cases mills have quoted for that period on the current basis of 1.65c., Pittsburgh. If a higher price should be asked, it would certainly not be obtained on much tonnage shipped in the next four months, although the present asking figure would be strengthened.

Cold-Finished Steel Bars

Improvement in demand reported the middle of February seems to have been checked temporarily, as specifications last week barely held their

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton

	Mar. 5, 1931	Feb. 24, 1931	Feb. 5, 1931	Mar. 4, 1930
No. 2 G'dy, Philadelphia	\$17.75	\$17.75	\$17.75	\$20.25
No. 2, Valley furnace	16.50	16.50	17.00	18.50
No. 2, Southern, Chi'to	14.15	14.15	14.15	16.65
No. 2, Birmingham	13.00	13.00	13.00	15.00
No. 2 foundry, Chicago*	17.50	17.50	17.50	19.50
Basic, del'd eastern Pa.	17.25	17.25	17.25	19.25
Basic, Valley furnace	16.50	16.50	17.00	18.50
Valley Bessemer, del'd P'gh	18.75	18.75	19.25	20.75
Malleable, Chicago*	17.50	17.50	17.50	19.50
Malleable, Valley	17.00	17.00	17.50	19.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	80.00	80.00	80.00	94.00

Rails, Billets, Etc., Per Gross Ton

	Mar. 5, 1931	Feb. 24, 1931	Feb. 5, 1931	Mar. 4, 1930
Rails, heavy, at mill	\$42.00	\$41.00	\$41.00	\$42.00
Light rails at mill	36.00	36.00	36.00	36.00
Rolling billets, Pittsburgh	30.00	30.00	30.00	32.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	32.00
Slabs, Pittsburgh	30.00	30.00	30.00	32.00
Forging billets, Pittsburgh	35.00	35.00	35.00	38.00
Wire rods, Pittsburgh	35.00	35.00	35.00	38.00
	Cents	Cents	Cents	Cents
Skeip. gr'd. steel, P'gh, H	1.60	1.60	1.60	1.85

Finished Steel

Per Lb. to Large Brackets	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.65	1.85
Bars, Chicago	1.70	1.70	1.75	1.95
Bars, Cleveland	1.70	1.70	1.70	1.85
Bars, New York	1.98	1.98	1.98	2.15
Tank plates, Pittsburgh	1.65	1.65	1.65	1.80
Tank plates, Chicago	1.70	1.70	1.75	1.95
Tank plates, New York	1.93	1.93	1.95	2.07½
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.80
Structural shapes, Chicago	1.70	1.70	1.75	1.95
Structural shapes, New York	1.90½	1.90½	1.90½	2.04½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.30
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.80
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.65

*The average switching charge for delivery to foundries in the Chicago district is 6½c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

	Mar. 5, 1931	Feb. 24, 1931	Feb. 5, 1931	Mar. 4, 1930
Per Lb. to Large Brackets	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.35	2.35	2.35	2.65
Sheets, black, No. 24, Chicago	2.45	2.45	2.45	2.75
dist. mill	2.90	2.90	2.90	3.10
Sheets, galv., No. 24, P'gh	3.00	3.00	3.00	3.40
Sheets, galv., No. 24, Chicago	3.05	3.05	3.05	3.45
dist. mill	3.50	3.50	3.50	3.80
Sheets, blue, No. 12, P'gh	2.15	2.15	2.15	2.55
Sheets, blue, No. 12, Chicago	2.25	2.25	2.25	2.65
dist. mill	2.70	2.70	2.70	3.00
Wire nails, Pittsburgh	1.90	1.90	1.90	2.25
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.30
Plain wire, Pittsburgh	2.20	2.20	2.20	2.40
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.45
Barbed wire, galv., Pittsburgh	2.55	2.55	2.55	2.85
Barbed wire, galv., Chicago	2.60	2.60	2.60	2.90
dist. mill	3.00	3.00	3.00	3.30
Tin plate, 100 lb. box, P'gh	\$5.00	\$5.00	\$5.00	\$5.25

Old Material, Per Gross Ton

	Mar. 5, 1931	Feb. 24, 1931	Feb. 5, 1931	Mar. 4, 1930
Heavy melting steel, P'gh	\$12.00	\$12.00	\$12.00	\$18.75
Heavy melting steel, Phila.	10.50	10.50	10.50	15.00
Heavy melting steel, Chgo.	10.00	10.00	10.12½	13.25
Carwheels, Chicago	10.50	10.50	10.50	15.00
Carwheels, Philadelphia	13.50	13.50	13.50	15.00
No. 1 cast, Pittsburgh	12.50	12.50	12.50	14.50
No. 1 cast, Philadelphia	11.50	11.50	12.00	15.00
No. 1 cast, Chgo (net ton)	9.50	9.50	9.50	13.75
No. 1 RR. wrot., Phila.	12.00	12.00	12.00	15.00
No. 1 RR. wrot., Chgo (net)	8.00	8.00	8.00	12.25

Coke, Connellsville

Per Net Ton at Oven	Mar. 5, 1931	Feb. 24, 1931	Feb. 5, 1931	Mar. 4, 1930
Paragon coke, prompt	\$2.50	\$2.50	\$2.50	\$2.60
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals

Per Lb. to Large Brackets	Cents	Cents	Cents	Cents
Lake copper, New York	10.62½	10.37½	9.87½	18.12½
Electrolytic copper, refinery	10.25	10.00	9.50	17.75
Tin (strait), New York	26.75	27.12½	25.25	37.00
Zinc, East St. Louis	4.05	3.95	4.10	5.10
Zinc, New York	4.10	4.10	4.15	5.45
Lead, St. Louis	4.35	4.35	4.40	5.85
Lead, New York	4.60	4.60	4.60	6.00
Antimony (Asiatic), N. Y.	7.00	7.10	7.12½	9.00

own. The month as a whole reflected a gain of about 10 per cent over January in both specifications and shipments, but tonnage on mill books for immediate release as of March 1 is hardly as large as it was a month ago. Consumers are showing little interest in second quarter prices and mills have not opened their books for that period. No change from the 2.10c., Pittsburgh, quotation is expected.

Tubular Goods

Inquiry for line pipe is still the feature of this market, although none of the large projects reported as particularly active in the last two weeks seems to have been let. Among the most recent lines to come out is a 265-mile project for the Sinclair Consolidated Oil Corp'n. to extend from Rusk County, Tex., to the company's Oklahoma oil properties, which will take 35,000 tons of 12-in. pipe. The Sinclair interests are also said to be contemplating an oil-carrying line from Rusk County to a Gulf port. A number of lines are being considered by Eastern companies, and inquiries

currently active call for at least 150,000 tons of pipe. Otherwise the market is rather quiet. Oil country demand is sluggish, and the building industry is reflecting little increase in its requirements of standard pipe. Mechanical tubing is moving to the automobile industry in better volume, but this business leaves much to be desired even when the comparatively low rate of automobile production is considered.

Wire Products

Heavier releases for barbed wire and fencing are coming from jobbers in the South and West, but current orders are for small lots and indicate a very cautious buying policy in the parts of the country affected by drought and low crop prices. Specifications for manufacturers' wire from the automotive industry have been somewhat heavier recently, and miscellaneous users are ordering in slightly better volume. Second quarter prices have not been announced and bright hard wire is currently quoted at 2.20c. While this price seems to be firm, shading of the

\$1.90 a keg price on nails is reported from some parts of the country.

Sheets

The gradual gain in sheet releases, which has been in evidence since the middle of February, has not been checked and specifications of one large producer last week were the best since October. While demand from the automobile industry has been well sustained, other consuming lines have also increased their requirements, notable among them being makers of steel furniture, electric refrigerators, road machinery and steel barrels and drums. Orders generally call for rush shipment and are still predominantly for small tonnages.

Operations have not yet fully reflected recent gains in specifications, and production is not much above 45 per cent of capacity. The schedules of individual mills vary sharply from week to week and it is not unusual for a unit to be down entirely for a week or more. Wide strip mills are running at a somewhat higher rate than the sheet industry in general,

THE IRON AGE COMPOSITE PRICES

Finished Steel			Pig Iron	Steel Scrap		
March 3, 1931	2.142c. a Lb.		\$15.71 a Gross Ton	\$11.17 a Gross Ton		
One week ago	2.142c.		15.71	11.17		
One month ago	2.142c.		15.88	11.13		
One year ago	2.305c.		18.17	14.75		
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.			Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.		
High			High	Low		
1929.....	2.362c., Jan. 7	2.121c., Dec. 9	\$18.21, Jan. 7	\$15.90, Dec. 16	\$15.00, Feb. 18	\$11.25, Dec. 9
1929.....	2.412c., April 2	2.362c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928.....	2.391c., Dec. 11	2.314c., Jan. 3	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927.....	2.453c., Jan. 4	2.293c., Oct. 25	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22
1926.....	2.453c., Jan. 5	2.403c., May 18	21.54, Jan. 5	19.46, July 13	17.25, Jan. 5	14.00, June 1
1925.....	2.560c., Jan. 6	2.396c., Aug. 18	22.50, Jan. 13	18.96, July 7	20.83, Jan. 13	15.08, May 5

having benefited from automobile tonnage placed last month.

Quotations for second quarter have not been announced, but in some cases consumers have been able to extend their contracts at old levels. Opinion differs widely regarding the talked-of advance in prices, and, while there is general agreement that present quotations are too low, some sales executives believe that a stronger demand must be experienced before an attempt to secure higher prices would be successful. The market is satisfactorily firm except in the case of galvanized sheets, on which shading of 2.90c., Pittsburgh, is not uncommon in the East.

Tin Plate

While recent gains in tin plate production have been maintained, no improvement is reported for last week. The leading interest ran its mills at slightly less than 70 per cent of capacity and will probably do as well in the current period. Several independent companies are still running at theoretical full and the average for the industry is about 75 per cent.

Strip Steel

Leading makers of strip steel have announced price advances of \$1 a ton on hot-rolled material and \$2 on cold-rolled to apply on second quarter business. This brings the asking price on cold-rolled strip to 2.35c., Pittsburgh or Cleveland, while hot-rolled is quoted at 1.60c., Pittsburgh, for 6-in. and wider and 1.70c. on the narrower widths. The new prices have not been tested as yet, but efforts will be made to adhere to them on all contract business for shipment after April 1. In some cases, it will probably be necessary to extend old prices, but recent quotations will likely represent the minimum on second quarter shipments. Specifications continue to improve, although the acceleration is hardly so marked as it was two weeks ago. The automobile makers are naturally the most active users, but general demand is still picking up, and operations average at least 50 per cent of capacity.

Coke

Warmer weather has brought less activity in heating coke and the other grades are characteristically dull. Little gain in foundry requirements is reported and the furnace grade is still depressed. Leading sellers are still quoting \$2.50, Connellsville, on furnace coke, but the market is not free from shading. Demand for domestic coal is lighter and industrial and railroad grades show little improvement.

Old Material

Following a week of considerable activity in several different grades, the scrap market has again become quiet, and is generally somewhat weaker in tone. Both dealers and mills are waiting reports on the Pennsylvania Railroad list, bids for which were to be opened on March 4, and considerable speculation exists as to

what prices will be offered. As bids of as high as \$13.50 for the No. 1 heavy melting steel were said to have been made when the list was offered a month ago, it is not thought likely that the steel will be sold this month for less. There is also a prospect of direct consumer buying from dealers by the large interest in the district, and the price paid at this point will also have an important bearing on the market.

Hydraulic compressed sheets are unchanged at \$12.75 to \$13.25, with no sales reported since a recent purchase at the higher figure. Heavy breakable cast is weaker, following sales at as low as \$10, although dealers are paying more than this to cover old orders at higher prices. Machine shop turnings and short shoveling steel turnings have been sold at \$8, but a sale of special material to be shipped in from an outside point is said to have brought considerably more. No. 1 cast is quiet, with dealers willing to pay up to \$13 for the best machinery grades, while ordinary cast is hardly worth \$12.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:

No. 1 heavy melting steel.....	\$12.75 to \$13.25
No. 2 heavy melting steel.....	11.25 to 11.75
Scrap rails.....	12.50 to 13.00
Compressed sheet steel.....	12.75 to 13.25
Bundled sheets, sides and ends.....	12.00 to 12.50
Cast iron car wheels.....	13.50 to 14.00
Sheet bar crops, ordinary.....	14.00 to 14.50
Heavy breakable cast.....	10.00 to 10.50
No. 2 railroad wrought.....	12.50 to 13.00
Hvy. steel axle turnings.....	11.00 to 11.50
Machine shop turnings.....	7.75 to 8.25

Acid Open-Hearth Grades:

Railr. knuckles and couplers.....	16.00 to 16.50
Railr. coil and leaf springs.....	16.00 to 16.50
Roller steel wheels.....	16.00 to 16.50
Low phos. billet and bloom ends.....	18.00 to 18.50
Low phos. mill plates.....	16.00 to 16.50
Low phos. light grades.....	16.00 to 16.50
Low phos. sheet bar crops.....	16.50 to 17.00
Heavy steel axle turnings.....	11.00 to 11.50

Electric Furnace Grades:

Low phos. punchings.....	15.00 to 16.00
Heavy steel axle turnings.....	11.00 to 11.50

Blast Furnace Grades:

Short shoveling steel turnings.....	7.75 to 8.25
Short mixed borings and turnings.....	7.50 to 8.00
Cast iron borings.....	7.50 to 8.00

Rolling Mill Grades:

Steel car axles.....	18.00 to 18.50
Cupola Grades:	
No. 1 cast.....	12.00 to 13.00
Rails 3 ft. and under.....	14.00 to 14.50

Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.

Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.75c.
Reinforcing steel bars.....	2.75c.
Cold finished and screw stock—	
Rounds and hexagons.....	3.35c.
Squares and flats.....	3.85c.
Bands.....	3.10c.
Hoops.....	4.10c.
Black sheets (No. 24), 25 or more bundles.....	3.25c.
Galv. sheets (No. 24), 25 or more bundles.....	3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates.....	2.75c.
Blue annealed sheets (No. 13), 1 to 24 plates.....	2.65c.
Galv. corrug. sheets (No. 28), per square.....	4.25c.
Spikes, large.....	2.65c.
Small.....	2.90c. to 3.05c.
Boat.....	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list.....	
Machine bolts, 100 count, 60 and 10 per cent off list.....	
Carriage bolts, 100 count, 60 and 10 per cent off list.....	
Nuts, all styles, 100 count, 60 and 10 per cent off list.....	
Large rivets, base per 100 lb.....	\$3.30
Wire, black, soft ann'd, base per 100 lb.....	2.40
Wire, calv. soft, base per 100 lb.....	2.85
Common wire nails, per keg.....	2.15
Cement coated nails, per keg.....	2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

CHICAGO

Steel Demand and Plant Operations Continue Expansion at Slow Rate

CHICAGO, March 3. There is a distinct improvement in the Middle West in the rate of acceleration of steel demand. One producer is now operating at 60 per cent of open-hearth capacity, while others are easily over 50 per cent. The average is well within the range of 53 to 55 per cent. The Inland Steel Co. has lighted its third stack, bringing the count of active steel mill furnaces to 15 out of 36, a net gain of three since the first of the year.

The heavier rate of ingot production is also reflected in the scrap market, as evidenced by buying on a broader scale and the acceptance of heavier tonnages against old commitments. Both hot-rolled and cold-rolled strip mills are raising production schedules, and rail rolling has been advanced to 55 per cent of capacity.

The plate market, which still lacks the support of car orders and which momentarily seemed about to lose what strength it had gained from pipe tonnage, is promised 23,000 tons from a recent order placed with the A. O. Smith Corp. for 100 miles of 24-in. pipe for the Texas to Chicago gas line.

The structural market, long dormant, is working into a stride which gives every evidence of providing quite satisfactory operations by early summer. The success of many municipal bond issues, State road programs and railroad bridge work afford some of the promising prospects.

Some sellers have advanced quotations on hot-rolled and cold-rolled strip steel. Consideration is being given to asking \$1 a ton more on plates, shapes and bars, while wire producers are feeling the market carefully with a thought toward higher prices. On the other hand, bolt and nut manufacturers and pig iron producers are carrying present quotations into the second quarter.

Pig Iron

This market is moving ahead rather steadily, but is spotty. Northern furnaces are carrying the \$17.50 price into the second quarter, for which period there is a moderate amount of interest. A user in Indiana is inquiring for 3000 tons of malleable and a Western manufacturer, with a plant in Connecticut, has placed 2000 tons. Output remains steady, though there is some possibility that the furnace at Duluth may be lighted in the near future. February shipments topped those of January. Releases now at hand augur well for heavier deliveries in March. A user in the St. Louis district has ordered 150 tons of 12 per cent silvery.

Steel demand continues to broaden moderately.

* * *

One steel producer operating at 60 per cent; average for district between 53 and 55 per cent.

* * *

Another steel mill blast furnace lighted, making net gain of three since first of year.

* * *

Structural steel market apparently on eve of expansion, as inquiries pile up.

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Scrap market shows signs of strengthening and of greater consumer interest.

ies in March. A user in the St. Louis district has ordered 150 tons of 12 per cent silvery.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil.	1.75	
to 2.25		\$17.50
N'th'n No. 1 fdy., sil.	2.25	
to 2.75		18.00
Malleable, not over 2.25 sil.		17.50
High phosphorus		17.00
Lake Super. charcoal, sil.		27.04
to 1.50		17.51
S'th'n No. 2 fdy., sil.		27.04
Low plus, sil. 1 to 2 cop-		17.51
per free	\$28.50 to	29.20
Silvery, sil. 8 per cent		26.79
Bess. ferro-silicon, 14-15 per		35.79
cent		

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable which are local furnaces, not including an average switching charge of 61c. per gross ton.

Ferroalloys

Increased output at steel mills is resulting in heavier releases. Spot buying is dormant.

Cast Iron Pipe

Unseasonably warm weather has drawn frost from the ground in most of the Chicago territory, and pipe laying operations are being pushed forward. The American Cast Iron Pipe Co. has taken 2200 ft. of 16-in. pipe for Fort Dodge, Iowa, and the Lynchburg Foundry Co. will supply 120 tons of 6 and 12-in. pipe for Keno-sha, Wis., on which the bid was \$45 a ton, delivered, or \$36.60, Birmingham. The Glamorgan Pipe & Foundry Co. is low at \$31.90 a ton, Birmingham, on 900 tons of pipe for Whitefish Bay, Wis. Other bids ranged from \$3 to \$5 a ton higher. The S. A. Healy Co., Detroit, has been awarded a general contract by the Chicago Sanitary District trustees and will soon place about 1800 tons of pipe, much of which is special.

Figures are being taken on a number of small filter and sewage treating plants in the Central States.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$14 to \$16; 4-in., \$17 to \$19; Class A and gas pipe, \$3 extra.

Rails and Track Supplies

Rail production in this district has been advanced to 55 per cent of capacity and accessory schedules have been raised in like proportion. Weather conditions remain favorable to track laying operations even in the Chicago area, where the backbone of winter appears to have been broken. A situation that is particularly encouraging is the freedom with which a number of railroads are specifying against carryover tonnages. Sales during the week, mostly small tonnages, include 10,350 tons, placed by the Western Pacific with the Colorado Fuel & Iron Co.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 2.80c.; steel tie plates, 1.95c.; angle bars, 2.75c.

Sheets

The volume of new business slowly expands. Hot mills are producing at about 55 per cent of capacity in this district. Users continue to buy cautiously and at short range and appear content to place confidence in the ability of mills to meet their delivery requirements. Backlogs are light and neither buyers nor sellers are making preliminary moves for second quarter business. It is rather generally acknowledged that producers are on the lookout for an opportunity to advance prices, but whether it will be possible for them to do so in the face of the slow recovery of business remains to be seen. Roofing and gutter manufacturers are more active, having advanced production schedules to about 70 per cent of capacity, a rate which is not far below normal for this time of year. Distribution by jobbers shows a slight upturn.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.80c. to 3.15c.; No. 10 blue and Td., 2.95c. to 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Bolts, Nuts and Rivets

Most sellers are now preparing second quarter contracts, which will be offered to consumers within the next week. Discounts will not be altered, notwithstanding some weakness which has been apparent recently. February shipments were a shade

heavier than those of January. It is too early in March to gage a change in trend.

Plates

It is reported that the Sinclair interests have purchased 35,000 tons of line pipe. Other pipe line inquiries are active. Orders for tank plates are confined to a few scattered lots from fabricators. About 1500 tons of steel will be needed for the 500 underframes inquired for by the Northern Pacific. The only other item of news in the railroad equipment market is the announcement by the Chicago & Eastern Illinois that it will scrap upward of 7000 cars.

Bars

The February movement of bars was fully 30 per cent heavier than for January, and specifications point to additional gains in the early part of March. Although many diversified users of bars are taking larger tonnages, automobile manufacturers are the mainstay of this market. Mild steel bars are firm at present quotations, and some producers are considering a \$1 a ton advance. Output of alloy steel bars is a shade above 50 per cent of capacity. Announcements concerning second quarter prices are still being withheld. The iron bar market is dull, with no promise of betterment in sight. Releases and new buying of rail steel bars are slowly gaining headway. Production at 40 per cent of capacity does not reflect shipments because of the size of stocks at mills.

Reinforcing Bars

Additional road lettings are soon to come up in Illinois, which is launching a \$45,000,000 program for 1931. Demand for bars for building purposes remains light. Plans are out for a dock at Marquette, Mich., which if constructed of reinforced concrete will require 1300 tons of bars, but if structural steel is used, only 400 tons of bars will be required. The general contract for the Chicago sewage treating plant has been awarded to a Detroit contractor. Fully 5000 tons of bars will soon be purchased for this project. Prices are in general somewhat stronger. Warehouses are obtaining as high as 2.75c. a lb. on small lots of billet reinforcing bars.

Structural Material

The outlook for structural tonnage is the best in many months. Chicago has voted \$55,000,000 for civic improvements. Bridge building programs throughout the West are large. Among interesting inquiries is one for 15,000 tons for hangars for the United States Government. These hangars, ranging in size from 200 to 1200 tons each, are to be erected in widely scattered parts of the country. Among noteworthy awards is 8200 tons for mill buildings for Inland Steel Co., Chicago, and outstanding among po-

tential inquiries is 9000 tons for the Chicago elevated lines.

Wire Products

Jobbers from a wide territory are now entering the market, and the spring movement of wire and wire products is under way. Mild weather in many sections of the Middle West has permitted outdoor work for which these products are needed earlier than usual. Oats and barley are already seeded in the more southerly parts of some Central States. The manufacturing trade has made some headway, but progress is slow and the future does not seem to be as well defined as is the case with jobbers' demand. It is quite evident that producers are satisfied with stocks now on hand because they are holding output close to 50 per cent of capacity, which is about the rate of current releases. Prices are taking on a firmer tone, and some thought is being given to advances when books are opened for the second quarter, a move which may come by March 10.

Cold-Rolled Strip

Several sellers of this commodity have advanced prices \$2 a ton, effective immediately. Quotations now are 2.25c. to 2.35c. a lb., Cleveland, or 2.53c. to 2.63c., delivered Chicago. Demand is distinctly better, with Western mills running in the range from 40 to 50 per cent of capacity, and releases are such that it is not at all unlikely that rolling schedules will soon be heavier.

Hot-Rolled Strip

One Western producer is announcing a price advance of \$1 a ton, and therefore quotations on hot strip wider than 6 in. at Chicago now range from 1.65c. to 1.70c. a lb. Production schedules at a nearby automobile frame manufacturing plant continue to grow, and heavier drafts are being made against contracts for hot-rolled strip.

Warehouse Prices, L.o.b. Chicago

Base per Lb.	
Plates and structural shapes	2.00c.
Soft steel bars	2.00c.
Reinforcing bars, billet steel	2.00c.
Rail steel reinforcement	1.50c. to 1.75c.
Cold-rolled steel bars and shafting	
Rounds and hexagons	3.45c.
Plats and squares	3.85c.
Rounds 1/2 in. On Nos. 10 and 12	
gages	2.10c.
Hoops (No. 14 gage and lighter)	2.00c.
Black sheets (No. 24)	2.80c.
Galv. sheets (No. 24)	4.55c.
Blue anti'd sheets (No. 10)	3.35c.
Spikes 1/2 in. and larger	2.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
Per Cent Off List	
Machine bolts	.60 and 10
Carriage bolts	.60 and 10
Cow and lag screws	.60 and 10
Hot pressed nuts, sq. tap, or blank	.60 and 10
Hot pressed nuts, hex. tap, or blank	.60 and 10
No. 8 black anti'd wire, per 100 lb.	\$3.45
Cum. wire nails, base per keg	2.30
Concent cold nails, base per keg	2.30

Coke

Prices remain steady at \$8 a ton, local ovens. Shipments in February gained only moderately over the volume moved in January.

Old Material

Steel mills are actively in the market for heavy melting steel. Tonnages purchased so far have not been large, but they are of interest because this is the first time in many months that there has been anything like a concerted buying movement. Prices paid range from \$10 to \$10.25 a gross ton, delivered. The attitude of the brokers appears to be that they hesitate to go short on the market, but when they attempt to cover they find little tonnage offered and stronger resistance from the price viewpoint. Ten thousand tons of unprepared scrap has been purchased for delivery to Peoria, Ill. Recent developments of the kind outlined are unquestionably giving this market a better background and if they continue will give strength to the whole structure.

Prices listed Chicago district consumers
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	\$9.75 to \$10.25
Shoveling steel	9.75 to 10.25
Frogs, switches and guards, cut apart, and misc. rails	9.75 to 10.25
Factory hyd. comp. sheets	8.25 to 8.75
Drop forge flashings	6.75 to 7.25
No. 1 busheling	7.00 to 7.50
Forg'd cast and r'd steel carwheels	13.00 to 13.50
Railroad tires, charge, box size	13.00 to 13.50
Railroad leaf springs cut apart	13.00 to 13.50
Axle turnings	8.50 to 9.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.00 to 12.50
Coil springs	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings	9.50 to 10.00
Low phosph. punchings	11.50 to 12.00
Low phosph. plates, 12 lb. and under	11.25 to 11.75
Blast Furnace Grades:	
Cast iron barings	4.75 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rolling Mill Grades:	
Iron rails	11.00 to 11.50
Rerolling rails	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	11.00 to 11.50
Cast iron carwheels	10.50 to 11.00
Malleable Grades:	
Railroad	11.75 to 12.25
Agricultural	10.75 to 11.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier	22.00 to 27.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	10.00 to 10.50
Iron arch bars, and transoms	11.00 to 11.50
Iron car axles	17.00 to 18.00
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	4.00 to 4.50
Locomotive tires, smooth	11.50 to 12.50
Pipes and flues	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast	9.50 to 10.00
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.00 to 8.50
Stove plate	7.25 to 7.75
Grate bars	7.00 to 7.50
Brake shoes	7.75 to 8.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND

Automobile Industry Chief Support of Increasing Steel Business

CLEVELAND, March 3.—Business in all the leading steel products gained moderately during February, and some further expansion in the demand is looked for this month. While the increase in tonnage has come mainly from the motor car field, most other metal-working industries have increased operations slightly and are ordering steel a little more freely, but only in small lots.

With the increase in automobile production schedules for March, orders for sheets from the Ford company and from some of the other motor car manufacturers, aggregating a substantial tonnage, were placed during the week. Some good business in rim sections came from rim-making plants in northern Ohio.

A local steel plant put on two additional open-hearth furnaces during the week, now operating its steel-making plant at 100 per cent. Increased tonnage from the motor car industry made possible the full operation. Cleveland steel plants are now operating at 59 per cent of ingot capacity, the best rate in many months.

Outstanding developments in the price situation are the announcement by several mills of an advance of \$1 a ton on hot-rolled and \$2 a ton on cold-rolled strip and the reaffirming by one producer of present sheet prices. Several strip manufacturers had previously taken a decided stand for better prices, but, if this advance holds, the hot-rolled material will still be \$1 a ton below the ruling price at the start of the fourth quarter.

Pig Iron

New business continues light and is confined mostly to small fill-in orders. Shipments by some furnaces gained a little in February over January, but with others showed no increase. However, the outlook for March is somewhat more promising, as more liberal releases are coming from the motor car industry. Demand from other consumers has not stepped up. The only sizable inquiry pending is for 2000 to 3000 tons of malleable iron from a Muncie, Ind., melter. Prices are unchanged at \$16 to \$16.50, Lake furnace, for foundry and malleable iron for Ohio and Indiana delivery and at \$17.50 for Michigan delivery. For Cleveland delivery, local furnaces quote \$17.50.

Prices per gross ton at Cleveland:

N'th'n fdy., sil.	1.75 to 2.25	\$17.50
S'th'n fdy., sil.	1.75 to 2.25	\$16.50 to 17.01
Malleable		17.50
Ohio silvery, 8 per cent.		25.00
Stand. low phos. Valley		27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$2 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore

The Ford Motor Co. has sent out an inquiry for its 1931 iron ore requirements, amounting to 265,000 tons. Last year the Ford company inquired for 330,000 tons. In view of the reduced activity of the motor car industry, a considerable reduction in the Ford ore requirements was expected. The inquiry is for 100,000 tons of basic ore, 90,000 tons of manganiferous and 75,000 tons of high phosphorus ore. Last year the Ford inquiry was for only 50,000 tons of manganiferous ore. This year silicious ore is dropped from the requirements. Last year the company inquired for 55,000 tons of this grade. As is usual, the Ford inquiry is the first to come into the market. Other buyers are showing no interest in covering for their ore requirements or in price. It is expected that last year's prices will be reaffirmed.

Bolts, Nuts and Rivets

Present prices on these products have been reestablished for the second quarter. These are 73 per cent discount for bolts and nuts, \$2.75 a 100 lb., Cleveland and Pittsburgh, and \$2.85, Chicago, for large rivets and 70, 10 and 5 per cent discount for small rivets. Bolt and nut business continues to increase slowly, the February volume being quite a little better than in January. Demand for rivets is still dull.

Bars, Plates and Shapes

Steel bars and structural shapes are moving fairly well, but most orders are small. Demand for alloy steel bars has expanded considerably. There is some seasonal improvement in the demand for reinforcing bars. Plates are still dull, although consumers report that they are figuring on more work than for some time. Structural inquiry is light. The 1.65c., Cleveland, price on steel bars seems to have virtually disappeared on new business, and little is now heard of any deviation from the 1.65c., Pittsburgh, price on plates and shapes.

Strip Steel

A price advance of \$1 a ton on hot-rolled strip and \$2 a ton on cold-rolled material for the second quarter has been announced by several producers, making the price 1.70c., Pittsburgh, for narrow strip and 1.60c. for wide, and 2.35c., Pittsburgh or Cleveland, for cold-rolled strip. Other mills are expected to make corresponding advances. While consumers probably will be slow in making contracts for the coming quarter at the higher prices, the advance is expected to bring out considerable tonnage this

month against first quarter contracts. No announcement has as yet been made regarding a price change on fender stock.

Sheets

Present prices on all grades have been named for the second quarter by one leading producer and others are expected to take similar action. The prices are 2.35c., Pittsburgh, for black, 2.05c. for No. 13 blue annealed, 1.90c. for No. 10 light plates, 2.90c. for galvanized, 1.75c. for No. 10 and 1.90c. for No. 13 continuous mill sheets, 3.30c. for auto body sheets, 3.60c. for steel furniture sheets and 3.70c. for enameling stock. The Ford Motor Co. placed a large tonnage the past week and some business came from other automobile companies in the Michigan territory. The Fisher Body Corp. is again in the market for sheets for making Chevrolet bodies in its Cleveland plant, having stepped up deliveries one week, which necessitated additional purchases for its March requirements. A large tonnage of steel furniture sheets will be required for partitions for the Empire State Building in New York, contract for which has been placed with a Cleveland plant.

Old Material

With no new consumer demand and little buying by dealers, the market is almost lifeless. A Cleveland mill continues to take some blast furnace scrap against old contracts, but dealers had previously covered against these orders. Prices are steady, with no upward or downward tendency. There is some demand from the Valley district. Dealers are paying \$12 for No. 1 heavy melting steel and \$11.50 for compressed sheet steel for delivery to Valley mills.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.75 to 10.00
Compressed sheet steel	9.25 to 9.50
Light bundled sheet	
stampings	7.50 to 7.75
Drop forge flashings	8.00 to 8.50
Machine shop turnings	4.75 to 5.25
Short shoveling turnings	7.00 to 7.25
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	8.50 to 9.00
Pipes and flues	5.50 to 6.00
Steel axle turnings	9.50 to 10.00
Acid Open-Hearth Grades:	
Low phos. billet bloom and slab crops	16.50 to 17.00
Blast Furnace Grades:	
Cast iron borings	7.00 to 7.50
Mixed borings and short turnings	7.00 to 7.50
No. 2 busheling	6.25 to 6.50
Cupola Grades:	
No. 1 cast	12.00 to 12.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 2 ft.	15.00 to 15.50
Miscellaneous:	
Rails for rolling	15.00 to 15.50
Railroad malleable	12.50 to 13.00

NEW YORK Structural Steel and Line Pipe Feature Steel Orders and Prospects

NEW YORK, March 3.—Pig iron demand has increased, although much of the gain in activity is in nearby New England rather than in this immediate district. Sales, at 10,000 tons, compare with 6000 tons in the previous week and 9000 tons two weeks ago. Crane Co., Bridgeport, Conn., is reported to have closed for 2000 tons, part low phosphorus and part foundry grade. The Crompton & Knowles Loom Works is in the market for 1000 tons of foundry for second and third quarter shipment to its Providence, R. I., plant. The inquiry of the General Fire Extinguisher Co., Providence, for 1000 tons is still pending. Miscellaneous small sales and inquiries are on the increase, but shipments are still showing relatively little improvement.

Hearings were held before the Interstate Commerce Commission at Washington last week on protests of Northern pig iron producers against existing rail-and-water rates from Alabama furnaces to destinations along the Eastern seaboard.

Prices per gross ton, delivered New York district:

Buffalo No. 2 hvy., sil. 147	\$19.31 to \$20.41
do 2 1/2 hvy., sil. 147	19.31 to 20.41
*Pitt. No. 2 hvy., sil. 147	18.25 to 19.75
do 2 1/2 hvy., sil. 147	17.25 to 18.75
East. Pa. No. 1 hvy., sil. 147	17.25 to 18.75
do 2 1/2 hvy., sil. 147	17.25 to 18.75
East. Pa. No. 2 hvy., sil. 147	17.25 to 18.75
do 2 1/2 hvy., sil. 147	17.25 to 18.75

Ex-ship rates: 1470 from Buffalo, \$1.75 to \$1.85 from eastern Pennsylvania. *Prices delivered to New Jersey cities having rate of \$1.25 a ton from Buffalo.

Finished Steel

There has been a moderate expansion of steel buying in the past week, particularly in structural steel and pipe. The situation is still extremely spotty, however, in that improvement has not affected all lines nor have all companies experienced noticeable gains. Outstanding awards include 20,000 tons of structural steel for the Metropolitan Life Insurance Co. Building, to be furnished by the Bethlehem Steel Corp., and 23,000 tons of fabricated steel for a viaduct and bridge in New Jersey, which went to the American Bridge Co. The Trojan Engineering Co. has placed 9000 tons of steel pipe with the National Tube Co., and the same maker also booked about 4000 tons of pipe for the Consolidated Gas Co. A new line pipe inquiry is for 35,000 tons for the Sinclair interests, and another is for 22,000 tons for a section of the Columbia Gas & Electric Co.'s line, which eventually will extend to Baltimore and Washington. An award is expected shortly of 110,000 tons of structural steel for nine buildings for Metropolitan Square, the Rockefeller project which is to cover several blocks fronting on Fifth Avenue.

The news of the week in the price situation is an advance of \$1 a ton on hot-rolled strip and \$2 a ton on cold-rolled. Nearly all makers have announced the higher prices. The principal effect thus far is an increase in specifications against first quarter contracts. It is not likely that the new prices, although they are to take effect immediately, will apply on much tonnage before the second quarter. The talked-of advance of \$1 a ton on plates, shapes and bars for the second quarter has not yet materialized. The general belief is that no advance will be announced, but that mills will make an effort to get the top of the present schedule on second quarter contracts, namely 1.65c., Pittsburgh, or 1.75c., Eastern basing points. These would be \$1 above the billing prices on most of the current contracts. Meanwhile, some irregularities in prices still exist. Plates have weakened slightly. Carload lots have been placed at 1.65c., Coatesville. Although this has not happened in many instances, it has not been difficult for buyers to obtain quotations of 1.70c., Coatesville, on anything desirable. Notwithstanding the reaffirmation of current discounts on bolts and nuts for the second quarter, there has been a good deal of price irregularity on these items. Concessions of \$1 a ton on galvanized sheets and wire nails continue, but mostly to jobbers.

Cast Iron Pipe

A fair tonnage of pressure pipe business continues to accumulate. The Providence Gas Co., Providence, R. I., is understood to have placed 1200 tons of gas pipe with the American Cast Iron Pipe Co. This maker has been awarded 3500 tons of water pipe for Manila, P. I., bids on which were opened in New York on Feb. 16. Brockton, Mass., is inquiring for 2200 tons of water pipe. Prices continue fairly firm at \$35 a ton, f.o.b. Northern foundry, occasional concessions appearing on substantial tonnages.

Prices per net ton, delivered New York: Water pipe, 6-in. and larger, \$27.00 to \$28.00; 1-in. and 2-in., \$10.00 to \$11.00. Cast iron, \$27.00 to \$28.00. Class A and B, \$27.00 to \$28.00.

Warehouse Business

Competition from imported structural shapes and bars, offered in small lots, is increasing and has had a depressing effect on jobbers' prices, which range on recent business from 2.70c. to 3.10c. a lb., base, the lower quotation being for lots of two to three tons. The foreign material is offered for resale as low as 2c. a lb., delivered, in some cases. Sheet prices also lack firmness, but not as a result of competition from imported ma-

terial. Concessions on black, galvanized and blue annealed sheets are usually \$1 to \$2 a ton, when more than a minor tonnage is offered.

Reinforcing Bars

Distributors are quoting 1.70c. a lb., Pittsburgh, or 2.03c., New York, for billet steel bars, but on substantial tonnages this price is still subject to a concession of \$1 a ton to 1.65c., Pittsburgh, or 1.98c., New York. Among the sizable awards of reinforcing bars in the past week was 1450 tons for the Federal penitentiary at Lewisburg, Pa., placed with the Sweet's Steel Co., Williamsport, Pa., maker of rail steel bars. James Stewart & Co. have awarded 860 tons of bars for a section of the West Side elevated highway, New York, and the Board of Transportation, New York, has placed 220 tons of bars.

Coke

Shipments of foundry coke are improving only slightly, indicating that castings business is still better in terms of prospects than in terms of actual orders. Furnace coke prices range from \$2.50 to \$2.60 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of beehive foundry coke, \$4.70 to \$4.85 a net ton, ovens, or \$4.41 to \$4.56, delivered to northern New Jersey, Jersey City and Newark, and \$3.29 to \$3.44 to New York and Brooklyn; by-product foundry coke, \$3 to \$3.40, Newark or Jersey City; \$10.00, New York or Brooklyn.

Old Material

No. 1 heavy melting steel is being bought at \$10.25 to \$10.50 a ton, delivered eastern Pennsylvania mills, or \$6.75 to \$7. New York, and brokers shipping by barge to a Bridgeport, Conn., consumer have advanced their buying price in some instances to \$7.75 a ton, f.o.b. barge, Brooklyn. Other grades of scrap are inactive and prices are generally unchanged.

Dealers' basing prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$6.75 to \$7.75
Heavy melting steel (yard)	5.00 to 5.25
No. 1 hvy. breakable cast	4.75 to 5.25
Stove plate (steel works)	4.75 to 5.00
Locomotive grate bars	4.75 to 5.00
Machine shop turnings	3.50 to 3.75
Sheet turning turnings	3.50
Cast borings (blast fur. or steel works)	3.50
Mixed borings and turnings	3.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge iron	7.00
No. 1 railroad wrought	8.75
No. 1 yard wrought, long	7.75
Rolls for rolling	9.25 to 9.75
Stove plate (foundry)	5.50 to 6.00
Malleable cast (railroad)	9.50 to 10.00
Cast borings (chemicals)	8.50 to 9.00

Prices per gross ton, delivered local foundries:

No. 1 runnery, cast	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.)	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

PHILADELPHIA

Steel Operations Unchanged— Foundries More Active

PHILADELPHIA, March 3.—Steel buying continues to show improvement, but the total tonnage being booked has not yet warranted an increase in operating rates of steel mills in this district, which continue at about 40 per cent of capacity, with the leading independent interest at about 54 per cent. Prices are being maintained.

Fabricating shops are bidding on some substantial contracts. About 4000 tons of fabricated structural steel will be required for a new section of the Broad Street subway in Philadelphia, on which bids will be asked March 4. A local fabricator is understood to have submitted the low bid on 52 Government aircraft hangars, requiring about 11,000 tons of structural steel. About 7000 tons of plates, shapes and bars for two liners being built for the Eastern Steamship Co. by a Delaware River shipyard have been placed with the leading interest. The Baldwin Locomotive Works, in addition to 10 locomotives booked a week ago, has closed a contract for eight to be built for the Milwaukee Road and 10 tenders for the Atchison, Topeka & Santa Fe.

Steel Bars

Prices are steady and unchanged at 1.60c., Pittsburgh, or 1.89c., Philadelphia, on medium-sized tonnages, and 1.65c., Pittsburgh, or 1.94c., Philadelphia, on miscellaneous specifications, or less than carload lots. Reinforcing bars continue to be quoted by distributors at 1.65c. to 1.70c., Pittsburgh, or 1.94c. to 1.99c., delivered Philadelphia, for billet steel bars, and about 1.50c., Franklin, Pa., or 1.79c., Philadelphia, for rail steel bars. Among current projects requiring fair tonnages of reinforcing bars is a school at Twelfth and Columbia Streets, Philadelphia, calling for about 300 tons, and a warehouse for the United States Marine Corps in Philadelphia, about 200 tons. A new \$4,000,000 section of the Broad Street subway, Philadelphia, on which bids will be asked March 4, includes a substantial tonnage of bars.

Pig Iron

Local foundries continue to operate at slightly better rates, especially foundries making castings for textile machinery used in eastern Pennsylvania silk mills, which are increasingly active. Better operating rates of foundries, however, have not brought much increase in pig iron orders. The foundry grade iron is quoted at \$17 to \$17.50 a ton, furnace, by eastern Pennsylvania producers. Southern makers have adopted a slightly firmer attitude and are in some instances quoting \$10.75 a ton, Birmingham furnace, as a minimum. Buyers, how-

ever, believe that on medium-sized tonnages \$10.50 a ton, furnace, would still be acceptable to the sellers. An Eddystone, Pa., consumer of basic iron is inquiring for 2000 to 3000 tons with 0.04 instead of the usual 0.05 maximum of sulphur. The iron is for delivery over the rest of this year.

Sanitary Co. of America, Linfield, Pa., states that it did not buy 1000 tons of foundry grade iron, as reported Dec. 25, 1930.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to	
2.25 sil.	\$17.76 to \$18.26
East. Pa. No. 2N, 2.25 to	
2.75 sil.	18.26 to 18.76
East. Pa. No. 1N, 1.75 to	18.76 to 19.26
Basic (del'd east. Pa.)	17.25 to 17.50
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cap. b'ric low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to	
2.25 sil.	22.25 to 22.75
Va. No. 2N, 2.25 to 2.75 sil.	22.75 to 23.25

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 70c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Shapes

Prices are unchanged, with 1.70c., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, the minimum on most business, and 1.75c., mill, or 1.81c., Philadelphia, applying on the smaller tonnages of shapes.

Plates

Although concessions of \$1 a ton from 1.70c., Coatesville, Pa., or 1.80½c., Philadelphia, are reported occasionally in other districts, the market here continues firm at the 1.70c. a lb., minimum, with 1.75c., Coatesville, or 1.85½c., Philadelphia, occasionally obtained on small orders. Locomotives and tenders booked last week by the shops at Eddystone, Pa., represent about 600 tons of quality plates. A Delaware River shipbuilder has placed 4600 tons of plates for two Eastern Steamship Co. liners with the leading interest.

Warehouse Prices, f.o.b. Philadelphia

Base per lb.	
Plates, 4-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq., twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	2.40c.
Cold-fin. steel, sq. and flats	2.30c.
Steel hoops	2.15c.
Steel bands, No. 12 to 4-in. incl.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
*Galvanized sheets (No. 24)	4.10c.
Light plates, blue annealed (No. 10)	3.00c.
Blue annealed sheets (No. 15)	3.20c.
Diam. pat. floor plates, 4-in. incl.	3.50c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.15c. base.
*For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.20c. base.

Sheets

Prices of sheets are generally unchanged at 2.90c., Pittsburgh, or 3.19c., Philadelphia, for galvanized and 2.35c., Pittsburgh, or 2.64c., Philadelphia, for black. Recent willingness of sellers to shade the 2.90c., Pittsburgh, price on galvanized sheets by \$1 a ton is less evident. Blue annealed sheets, No. 13 gage, are quoted at 2.05c., Pittsburgh, and blue annealed plates, No. 10 gage, are 1.90c., Pittsburgh, or 2.19c., Philadelphia. These quotations are firmly maintained on the jobbing mill width, but concessions are usually granted when competition is encountered from the product of the continuous mill.

Imports

In the week ended Feb. 28, 5808 tons of manganese ore arrived at this port from Brazil and 50 tons of pig iron from the Netherlands. Steel arrivals consisted of 17 tons of steel bearing tubes and 13 tons of steel bearing bars from Sweden.

Old Material

The scrap market continues inactive in all grades. No. 1 heavy melting steel is still quotable at \$10 to \$11 a ton, delivered eastern Pennsylvania. A Coatesville, Pa., mill has closed on about 500 tons of heavy breakable cast at \$11 a ton, delivered. A Phoenixville, Pa., consumer of machine shop turnings, which was recently offering \$6.50 a ton, delivered, for turnings of local origin and \$7.50 a ton for turnings shipped on a New England freight rate, is quoting a single price of \$7.50 a ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district

No. 1 heavy melting steel	\$10.00 to \$11.00
No. 2 heavy melting steel	9.00
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	11.50 to 12.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel works)	7.50
Heavy axle turnings (for shipv.)	9.50 to 10.00
Cast borings (for steel works and roll mill)	7.50
Heavy breakable cast (for steel works)	11.00
Railroad grate bars	9.00
Stave plate (for steel works)	9.00
No. 1 low phos. Ryv.	17.00 to 18.00
6.04% and under	15.50 to 16.00
Couplers and knuckles	15.50 to 16.00
Roller steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	6.00 to 6.50
Wrot. iron and soft steel pipes and tubes (new spec'd)	11.50 to 12.00
Shaffing	18.00
Steel axles	17.50 to 18.00
No. 1 forge bar	11.00
Cast iron car wheels	13.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rolls for rolling	12.50 to 13.00

ST. LOUIS

Steady Flow of Small Pig Iron Orders— Steel Bookings Gain

ST. LOUIS, March 3.—A fairly steady flow of orders for pig iron is reported by makers and their representatives here, although the size of the individual orders continues small in line with the conservative attitude of melters. Sales for the first two months of the first quarter of 1931 are considerably ahead of those of the same period in the preceding quarter, the increase being regarded as more or less seasonal. Shipments of the local maker for February, although a shorter month, are ahead of those of January. While Southern Iron is still quoted at \$19.50, Birmingham, for shipment into this territory, the market is strong, and a 50c advance may be expected, according to word received from the makers.

Prices per gross ton at St. Louis	
No. 2 fdy., 1.75 to 2.25 lb. per 100 lb.	\$17.00
Black sheets (No. 24)	4.25c
Galv. sheets (No. 24)	4.60c
Blue annealed sheets (No. 24)	4.45c
Black corrug. sheets (No. 24)	4.10c
Galv. corrug. sheets	4.70c
Structural rivets	4.15c
Boiler rivets	4.15c

PP. 248-249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Finished Steel

Bookings for the first 26 days of February of the Granite City Steel Co. exceeded the total bookings for January. During the last week the company saw a slight improvement in the demand for galvanized sheets. The demand for black sheets is fair, but plates are moving slowly. The call for blue annealed sheets is good. Tin plate continues quite active. The Laclede Steel Co. has received an award of 600 tons of reinforcing bars for a hospital. There has been no increase in the operations of the structural steel fabricating plants, which

Warehouse Prices, Loc. St. Louis

	Price per lb.
Plates and steel shapes	3.25c
Bars, cut steel or iron	3.15c
Cold fin. rounds, shaftings, screw	4.60c
Black sheets (No. 24)	4.25c
Galv. sheets (No. 24)	4.60c
Blue annealed sheets (No. 24)	4.45c
Black corrug. sheets (No. 24)	4.10c
Galv. corrug. sheets	4.70c
Structural rivets	4.15c
Boiler rivets	4.15c

Percent Off List	
Tank rivets, 3/8 in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lock screws	60
Hex-nutted nuts, sq. blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hex-nutted nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

are at between 15 to 20 per cent of capacity.

Old Material

An East Side mill took about 2000 tons of heavy melting and shoveling steel during the week; otherwise trade was dull. Railroad lists are somewhat heavier, but the movement from the country dealers has been temporarily halted because of low prices. Mills are fairly well stocked with old material, and will not buy except to fill in until there is a better demand for finished products. No. 2 heavy melting or shoveling steel, miscellaneous standard-section rails and No. 1 bushing are 25c. off.

Railroad lists: Pennsylvania, 50,250 tons; Missouri-Kansas-Texas, 1200 tons; Chesapeake & Ohio, 150 tons; Missouri Pacific, 107 carloads; Milwaukee Road, 67 carloads; Cleveland, Cincinnati, Chicago & St. Louis, 17 carloads; Nashville, Chattanooga & St. Louis, 13 carloads; St. Louis-San

Francisco, 5 carloads; Peoria & Eastern, 4 carloads.

Dealers' buying prices per gross ton, loc. at Louis district:

Selected heavy melting steel	\$10.50 to \$11.00
No. 1 heavy melting or shoveling steel	9.00 to 9.50
No. 2 heavy melting or shoveling steel	8.50 to 9.00
No. 1 locomotive tires	10.75 to 11.00
Misc. stand-sec. rails including frogs, switches and guards, cut apart	8.75 to 9.00
Railroad springs	12.00 to 12.50
Bundled sheets	8.50 to 9.00
No. 2 railroad wrought	9.00 to 9.50
No. 1 bushing	8.50 to 9.00
Cast iron borings and shoveling turnings	8.25 to 8.50
Iron rails	8.00 to 8.50
Rails for rolling	10.75 to 11.00
Machine shop turnings	7.50 to 8.00
Heavy turnings	7.00 to 7.50
Steel car axles	14.50 to 15.00
Iron car axles	10.00 to 10.50
Weld. iron bars and trais	11.00 to 11.50
No. 1 railroad wrought	10.00 to 10.50
Steel rails, less than 2 ft.	10.00 to 10.50
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.75 to 9.00
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.50 to 10.00
Stove plate	7.50 to 8.00
Heavy rails, 60 lb. and under	10.00 to 10.50
Heavy rails, 70 lb. and over	10.00 to 10.50
Agricult. malleable	9.50 to 10.00

BIRMINGHAM

Pig Iron Prices Slightly Firmer— Steel Demands Gain

BIRMINGHAM, March 3.—February closed with the price of No. 2 foundry pig iron firmer at \$13, and the rate of shipments by merchant producers was slightly better than in January. Two merchant producers reported shipments in excess of production. New tonnage now is mostly in small lots and more or less on a spot basis.

Woodward Iron is operating two furnaces on foundry, Sloss-Sheffield, two on foundry, Republic Steel, one on foundry, Gulf States Steel, one on foundry, and the Tennessee company, three on basic, one on recarburizing and one on spiegeleisen. The latter was changed from low phosphorus. This makes a total of 11 active furnaces, unchanged since early in February.

Prices per gross ton, loc. Birmingham dist. furnaces	
No. 2 fdy., 1.75 to 2.25 lb. per 100 lb.	\$13.00
No. 1 fdy., 2.25 to 2.75 lb. per 100 lb.	13.50
Basic	13.00

Finished Steel

During the last 10 days of February there was an improved accumulation of new tonnage in practically all lines of finished steel. This swing is continuing into March, and the outlook is favorable, as inquiries indicate a fair volume of tonnage in prospect. Fabricators have some advance tonnage booked, and their plant operations are being sustained at an even rate. New bridges and other public projects will provide good orders within the next several months. Bars for the New Orleans airport project, approximately 3000 tons, were awarded to Laclede Steel Co., St. Louis.

Open-hearth operations continue at 16 out of 23, with the Tennessee company having 13 active and Gulf States Steel three.

Cast Iron Pipe

Los Angeles opened bids on approximately 3000 tons pipe and contracts were tentatively awarded. About 2000 tons will be placed with Birmingham plants. The increase in new tonnage in January was not sustained to the same extent in February, but there has been a fair volume of small orders. Projects being planned indicate larger orders during the next two months. Quotations remain nominally at \$37 to \$38.

Old Material

After a lean period of several weeks, there was some buying during the one just past. This covered several grades such as heavy melting steel, steel rails and some cast scrap. The change was due more to an exhaustion of melters' stocks rather than to increased operations. Buying is being done just as needed, but the feeling for March is somewhat better. Prices are unchanged.

Prices per gross ton, loc. Birmingham dist. consumers' yards:

Heavy melting steel	\$10.50 to \$11.00
Scrap steel rails	10.50
Short shoveling turnings	9.00
Cast iron borings	8.50
Stove plate	8.50
Steel axles	10.00
Iron axles	10.00
No. 1 railroad wrought	11.50 to 12.00
Rails for rolling	11.50 to 12.00
No. 1 cast	11.00
Tramcar wheels	11.00 to 11.25
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

CINCINNATI

Foundries Increasing Melt Slightly—
Sheet Demand Well Diversified

CINCINNATI, March 3.—While pig iron sales were smaller in the past week than during the preceding week, the trade feels that the market is beginning to assume a better aspect. Sales of the week were about 2100 tons, of which 600 tons went to Southern furnaces. The only sizable order was from a southern Ohio consumer for 100 tons of Northern foundry iron. Foundries have increased the melt slightly as new business improves. An Indiana consumer is inquiring for 2000 to 3000 tons of malleable iron, and a south central Ohio buyer is in the market for 150 tons each of Northern and Southern foundry iron.

Prices per gross ton, deliv'd Cincinnati:

Ala. 60c., sil. 1.75 to 2.25. \$11.19 to \$14.69
Ala. 60c., sil. 2.25 to 2.75. 11.69 to 15.19
Tenn. 60c., sil. 1.75 to 2.25. 11.19 to 14.69
S. Ohio silvery, 8 per cent. 21.39

Freight rates: \$1.89 from London and Jackson, Ohio; \$3.69 from Birmingham.

Coke

Movement of foundry coke on contract is at a better rate than last month. Prices on by-product foundry coke will continue at about \$9, delivered in Cincinnati, for March.

Finished Steel

The well-diversified demand for sheets that has sustained operations of district mills above a 50 per cent level for the last five or six weeks is still in evidence. Orders from practically all the leading sheet-consuming industries were reported.

Warehouse Prices, f.o.b. Cincinnati

	Base per lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforce bars	3.15c.
Rail steel reinforce bars	3.00c.
Hoops	2.90c.
Rounds	3.25c.
Cold fin. rounds and hex.	2.80c.
Squares	4.30c.
Black sheets (No. 24)	1.05c.
Galvanized sheets (No. 24)	1.90c.
Blue ann'd sheets (No. 10)	2.45c.
Structural rivets	4.20c.
Small rivets	50 per cent. off list
No. 6 ann'd wire, per 100 lb.	\$3.00
Cold wire nails, base per keg 425	2.95
Kege of more	2.95
Cement c'd nails, base 100 lb. keg	2.95
Clamps per 100 lb.	10.25
Net per 100 lb.	
Lathe-worked steel boiler tubes, 2-in.	\$16.50
4-in.	14.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	26.00

Old Material

New business is not frequent, although mills continue to accept material on old contracts. Dealers' bids are unchanged.

Dealers' bidding prices per gross ton, f.o.b. Cincinnati:

Heavy melting steel	\$8.50 to \$10.00
Scrap rails for melting	10.50 to 11.00
Foundry scrap clippings	5.50 to 6.00
Handed sheets	8.75 to 9.25
Cast iron borings	1.50 to 5.00
Machine shop turnings	3.00 to 5.50
No. 1 bushing	8.00 to 8.50
No. 2 bushing	4.50 to 5.00
Rails for rolling	11.50 to 12.00
No. 1 locomotive tire	10.00 to 10.50
No. 2 railroad wrought	9.50 to 10.00
Short rails	14.25 to 14.75
Cast iron car wheels	10.50 to 11.00
No. 1 machinery cast	14.00 to 14.50
No. 1 railroad cast	12.00 to 12.50
Burnt cast	6.50 to 7.00
Stove plate	6.50 to 7.00
Brake shoes	6.50 to 7.00
Agricultural malleable	11.00 to 11.50
Railroad malleable	12.00 to 12.50

base. Mild steel bars range from 2.15c. and 2.25c., c.i.f. Demand for this class of material continues light.

Plates

The only new inquiry of importance involves 210 tons for a 20-in. welded steel pipe line for the East Bay Municipal Utility District, Oakland, bids on which will be opened March 11. No action has yet been taken on 750 tons for a ferry boat at San Diego or on 300 tons and 1300 tons respectively for pipe lines at Seattle and Aberdeen, Wash. Prices range from 2.05c., and 2.25c., c.i.f.

Shapes

Among structural awards, which totaled more than 1000 tons, was 925 tons for a pier for Canadian National steamships at Vancouver, B. C., booked by the Western Bridge Co., Ltd. Two bridges, over the Elk Creek in Oregon, calling for 141 tons, were placed with unnamed interests. Dyer Brothers were low bidders on 250 tons for a Science Building in San Francisco. Bids will be opened on 300 tons for a bridge over Islais Creek, San Francisco, on March 25. Prices on plain shapes range from 2.15c. to 2.25c., c.i.f.

Cast Iron Pipe

Only two awards of importance were reported. The United States Pipe & Foundry Co. secured 233 tons of 4 to 8-in. Class B pipe for Aberdeen, Wash. Los Angeles placed 1290 tons of 8-in. Class 250 pipe with the National Cast Iron Pipe Co. and 960 tons of 12-in. Class 350 pipe with R. D. Wood & Co. The United States Pipe & Foundry Co. is low bidder on 2264 tons of 6 to 20-in. Class B pipe for Long Beach, Cal. Bids have been opened on 833 tons of 6-in. Class B pipe for Los Angeles and on 765 tons of 4 to 8-in. Class B pipe for Burnaby, B. C. Bids will be opened March 9 on 850 tons of 12-in. pipe for Vancouver, B. C., at which time alternate bids will also be taken on steel pipe.

PACIFIC COAST

More Structural Projects Being
Figured—10,350-Ton Rail Order

SAN FRANCISCO, Feb. 28. (By Air Mail)—Demand for steel products has shown little improvement during the past week, although some increase is noted in the number of structural projects being figured. The feature of the week was the placing of 10,350 tons of 110-lb. rails by the Western Pacific Co., San Francisco, with the Colorado Fuel & Iron Co.

Bars

Awards of reinforcing steel bars so far this year exceed the total for the

Pig iron prices per gross ton at San Francisco:

*Utah basic	\$22.00 to \$24.00
Utah 60c., sil. 2.75 to 3.25	22.00 to 24.00
*Indiana 60c., sil. 2.75 to 3.25	22.00 to 24.00
*Delivered San Francisco.	
**Duty paid, f.o.b. cars San Francisco.	

same period last year by 2700 tons, the total to date being 8501 tons. Among the larger awards of the past week were 240 tons for highway work in San Joaquin County, Cal., 191 tons for two bridges over the Elk Creek in Oregon and 150 tons for a high school in Pasadena, Cal., all placed with unnamed interests. The largest new inquiry involves 4000 tons for the Sixth Street bridge, Los Angeles, bids on which will be opened March 25. Out-of-stock quotations on carload lots remain unchanged in the Los Angeles and San Francisco districts at 2.50c.,

Warehouse Prices, f.o.b. San Francisco

	Base per lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.10c.
Black sheets (No. 24)	1.35c.
Blue ann'd sheets (No. 10)	2.80c.
Galv. sheets (No. 24)	3.00c.
Struc. rivets, 1/2-in. and larger	3.00c.
Com. wire nails, base per keg	\$3.35
Cement c'd nails, 100 lb. keg	3.35

Illinois Steel Completes New Alloy Bar Mill

The Illinois Steel Co. has completed a new alloy steel bar mill at its South Chicago Works. This unit marks another step toward the completion of an expansion program calling for a 2,500,000 ton increase in annual capacity. The annual alloy steel bar capacity of the Illinois Steel Co. is now 300,000 tons of all grades and sizes.

Daily Metal Trade, Cleveland, has published a booklet containing standard price extras on steel products sold on a net price basis and list prices of those products sold on a list and discount basis.

BUFFALO Foundry Operations Gaining Slightly—Scrap Market Shows Stronger Trend

BUFFALO, March 2.—A slight improvement in foundry operation is noticeable, but the purchasing of pig iron continues to be in small lots. Total commitments in this district over the past week have been about 3000 or 3500 tons, all in small lots. About the only sizable inquiry before the local market is one for 1000 tons of foundry grades from the General Fire Extinguisher Co. Furnace interests are cutting down iron stocks.

Prices per gross ton, f.o.b. furnace:
No. 2 fdy., sil. 1.75 to 2.25.....\$17.50
No. 2N fdy., sil. 2.25 to 2.75.....18.00
No. 1 fdy., sil. 2.75 to 3.25.....19.00
Malleable, sil. up to 2.25.....18.00
Basic.....17.00
Lake Superior charcoal.....27.28

Finished Steel

Operations of steel plants in this district have not materially changed in the week, although the Lackawanna works of the Bethlehem Steel Co. has taken off one open-hearth furnace, now running 17. Its mills are scheduled at about 60 per cent. The March schedule for the steel-making department at this plant, so far as it can at present be determined, will be about the same as the February schedule. Improved sheet mill schedules are reported by the Seneca Iron & Steel Co., which is now operating at 60 to 65 per cent.

Old Material

The only scrap purchase of note involved about 2000 tons of stove plate, which brought somewhere between \$10 and \$10.50, delivered. This grade is stronger on the basis of offers of \$10.25 to \$10.75 by a user just outside of Buffalo. A sale of machinery cast is reported at \$10 to \$10.50. The heavy melting steel scrap market is stiffer. Dealers who recently took an order for No. 2 steel

Warehouse Prices, f.o.b. Buffalo	
	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Flats.....	3.50c.
Hoops.....	3.90c.
Blue anne'd sheets (No. 10).....	3.50c.
Dom. wire nails, base per keg.....	\$2.60
Black wire, base per 100 lb.....	3.20

at \$9.50 are compelled to pay \$9.50 to \$10 to cover.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$11.00 to \$11.50
No. 2 heavy melting scrap.....	9.50 to 10.00
Scrap rails.....	11.00
Hydral. comp. sheets.....	9.50 to 10.00
Hand bundled sheets.....	8.00 to 8.50
Drop forge flashings.....	9.50 to 10.00
No. 1 busheling.....	9.50 to 10.00
Hvy. steel axle turnings.....	10.50 to 11.00
Machine shop turnings.....	5.50 to 6.00
No. 1 railroad wrought.....	9.00 to 9.50
Acid Open-Hearth Grades:	
Kneekles and couplers.....	13.50 to 14.00
Cod and leaf springs.....	13.50 to 14.00
Roller steel wheels.....	13.50 to 14.00
Low phos. billet and bloom ends.....	15.00 to 15.50
Electric Furnace Grades:	
Short shov. steel turnings.....	8.50 to 9.00
Blast Furnace Grades:	
Short mixed borings and turnings.....	7.00 to 7.25
Cast iron borings.....	7.00 to 7.25
No. 2 busheling.....	6.00
Rolling Mill Grades:	
Steel car axles.....	15.00 to 15.50
Iron axles.....	16.00 to 16.50
Cupola Grades:	
No. 1 machinery cast.....	11.00 to 11.50
Stove plate.....	10.00 to 10.50
Locomotive grate bars.....	8.25 to 9.25
Steel rails, 3 ft. and under.....	15.00 to 15.50
Cast iron carwheels.....	12.00 to 13.50
Malleable Grades:	
Industrial.....	11.00 to 12.00
Railroad.....	11.00 to 12.00
Agricultural.....	11.00 to 12.00
Special Grades:	
Chemical borings.....	9.50 to 10.00

more than Canadian sales. No iron is arriving from Europe at the present time. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.10
Malleable.....	22.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

Old Material

Mills are still adhering to a hand-to-mouth buying policy and are taking in special grades of steel scrap in small tonnage lots. Foundries, however, are buying more extensively, mostly for spot delivery. Deliveries against old contracts are showing improvement. Prices are unchanged.

Dealers' buying prices for old material: Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Roller plate.....	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings.....	2.00	2.00
Steel borings.....	2.00	2.00
Wrought pipe.....	2.00	2.00
Steel axles.....	7.00	9.00
Axles, wrought iron.....	7.00	11.00
No. 1 machinery cast.....	11.00	10.00
Stove plate.....	9.00	8.00
Standard carwheels.....	10.00	8.50
Malleable.....	8.00	8.00
Per Net Ton		
No. 1 mach'y cast.....	11.00	.....
Stove plate.....	9.00	.....
Standard carwheels.....	10.00	.....
Malleable scrap.....	9.00	.....

Steel Scrap Weaker at Detroit, Cast Higher

DETROIT, March 3.—The scrap market has continued to give ground. Several items, including heavy melting steel and compressed sheets, are 25c. a ton below last week's prices. Automotive cast is a notable exception, as increased demand by consumers is gradually depleting the available supply, with the result that dealers are paying 25c. a ton more than they did a week ago. The local steel plant is said to have large stocks, consequently is temporarily out of the market.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel.....	\$9.00 to \$9.50
Borings and short turnings.....	5.00 to 5.50
Long turnings.....	4.25 to 4.75
No. 1 machinery cast.....	9.50 to 10.00
Automotive cast.....	11.25 to 11.75
Hydral. comp. sheets.....	8.75 to 9.25
Stove plate.....	6.50 to 6.75
New No. 1 busheling.....	7.50 to 8.00
Old No. 2 busheling.....	3.25 to 3.75
Sheet clippings.....	6.25 to 6.50
Flashings.....	7.50 to 8.00

* Briggs & Turivas, Chicago, have purchased for \$125,000 the 38-mile line of the Youngstown & Ohio River Railroad, which extends between Salem and East Liverpool, Ohio.

CANADA Signs of Moderate Expansion in Iron and Steel Business in Dominion

TORONTO, March 3.—New business for various lines of iron and steel products is expanding in the Canadian markets. While most of the recent buying has been by the railroads, increased volume is now appearing from other sources. Foundries are beginning to step up production, and it is expected that practically all railroad equipment plants will be running close to full time before the middle of March. Improvement in the building trades is having a stimulating effect on some lines of iron and steel products. The Montreal office of the Dominion Steel & Coal Co., Sydney, N. S., has closed a contract for 20,000 kegs of nails. Wire and nail sales through jobbers are said

to be showing steady improvement. Gains in automotive schedules have created a larger demand for sheets and other steel products.

Pig Iron

While there was little of special interest in this market during the week, sales were well sustained, according to local blast furnace representatives. Foundries continue to show interest in the market and are taking in lots of 50 to 300 tons for immediate requirements. The foundry melt is holding around 60 per cent, with indications of an early increase. The agricultural implement industry has not kept pace with some other lines of the industry, but this affects imports

BOSTON Pig Iron and Cast Iron Pipe Sales Increase— Scrap Slightly More Active

BOSTON, March 3.—Pig iron sales increased the past week to about 3500 tons, compared with not more than 1000 tons the previous week. Of the 3500 tons, the Mystic Iron Works took 2700 tons. The General Fire Extinguisher Co., Providence, R. I., this week will close on 1000 tons of No. 1X, May to September delivery, the Crompton & Knowles Loom Works, Worcester, Mass., on 1000 tons of No. 1X, part second quarter and part third quarter delivery, and the Westinghouse Electric & Mfg. Co., Springfield, Mass., on 250 tons for delivery on or before April 15. Southern furnaces are making low prices in this territory. No. 1 foundry being offered at \$11.50 a ton, furnace.

Foundry iron prices per gross ton delivered to most New England points:

*Buffalo, sfl. 1.75 to 2.25...	\$19.91 to \$20.91
*Buffalo, sfl. 2.25 to 2.75...	19.91 to 20.91
*Ala., sfl. 1.75 to 2.25...	20.11
*Ala., sfl. 2.25 to 2.75...	20.61
*Ala., sfl. 1.75 to 2.25...	19.75
*Ala., sfl. 2.25 to 2.75...	17.25

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe

The market continues fairly active, sales the past week having totaled about 8000 tons. Prospects are that March and April bookings will be quite heavy. Sales the past week included 2100 tons to the Lowell Iron & Steel Co. at \$39.10 a ton from Lowell, Mass. The Warren Foundry & Pipe Co. probably will furnish the pipe. Pembroke, Mass., has placed 1882 tons of 6 to 10-in. pipe with French interests; Albany, N. Y., 1345 tons of 6-in. Class C pipe, 85 tons of 8-in., 165 tons of 12-in. and 1183 tons of 20-in., a total of 2778 tons, with the United States Pipe & Foundry Co.; Braintree, Mass., 300 tons with the Warren Foundry & Pipe Co.; Gardner, Mass., 160 tons of 8 and 10-in. with R. D. Wood & Co.; Weston, Mass., 100 tons of 4, 6 and 10-in. with the United States Pipe & Foundry Co.; a Massachusetts utility company, 15,000 ft. of 6-in. gas pipe and 2700 ft. of 4-in. with the Warren Foundry & Pipe Co., while quite a few municipalities placed car lot orders. The Warren Foundry & Pipe Co. was the low bidder on 140 tons of 6 and 8-in. required by Medford, Mass., but no award has been made. Brockton, Mass., will close bids March 4 on 2200 tons, mostly 24-in. pipe, and Yarmouth, Mass., on March 11 on four miles of 6, 8, 10 and 12-in.

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Reinforcing Steel

Sales the past week were but 751 tons, consisting of one 300-ton lot, one 126-ton lot and one 125-ton lot. It is likely that 1500 tons for the Boston Post Office and 300 tons for a Springfield, Mass., Post Office will be closed next week. Prices from stock: One to 5-ton lots, 3c. a lb., base; six to 99-ton lots, 2.40c.; 100-ton lots and larger, 2.26½c.

Old Material

Most brokers continue to report

little business, but more scrap was shipped to Pennsylvania the past week than in any similar period during the past three months. Shipments included No. 1 heavy melting steel at \$13 a ton, delivered, on a \$5.70 freight rate, making the price on cars here \$7.30; T rails at \$6.50 to \$7 a ton on cars and cotton ties for Reading delivery at \$5 a ton on cars. Some breakable cast was moved at \$6.25 to \$6.50 a ton on cars. Other kinds of scrap are inactive. The Boston & Albany Railroad is taking bids on 200 tons of steel, 200 tons of rails and 200 tons of miscellaneous scrap.

Buying prices per gross ton, f.o.b. Boston and shipping points:

No. 1 heavy melting steel	\$6.75 to \$7.30
Scrap T rails	6.50 to 7.00
Scrap girder rails	5.50 to 6.00
No. 1 railroad wrought	7.00 to 7.50
Machine shop turnings	2.00 to 2.60
Cast iron borings (steel works and rolling mill)	2.00 to 2.60
Bundled skeleton, long	6.00 to 6.10
For a flashings	5.60 to 6.10
Black furnace borings and turnings	2.00 to 2.60
Pure scrap	5.10 to 5.60
Shafting	13.00 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.50 to 7.00
Rails for rolling	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.60
No. 2 cast	5.10 to 5.60

Prices per gross ton delivered consumers' yards:

Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	10.50 to 11.00
Stove plate	7.00 to 7.25
Railroad malleable	13.00 to 13.50

Technical Papers for Welding Symposium

A symposium on welding has been arranged as a feature of the second regional meeting sponsored by the American Society for Testing Materials to be held in Pittsburgh at the Hotel William Penn, March 18.

Two sessions of three hours each, morning and afternoon, will be devoted to the presentation of the following papers:

"General Survey of Welding Processes," by F. T. Llewellyn, United States Steel Corp.

"Welding Processes Applicable to Aluminum," by W. M. Dunlap, Aluminum Research Laboratories.

"The Quality of Materials for Fusion Welding," by C. R. Texter and F. N. Speller, National Tube Co., for Subcommittee XXI on steel for welding of Committee A-1, A.S.T.M.

"Modern Applications of Arc Welding," by A. M. Candy, welding engineer, Westinghouse Electric & Mfg. Co.

"Recent Developments in Gas Welding and Cutting," by E. J. W. Egger, development engineer, Linde Air Products Co.

"Stethoscopic Examination of Welded Products," by J. R. Dawson, Metallurgical engineer, Union Carbide & Carbon Research Laboratories, New York.

"Tests of Welding Made by the Watertown Arsenal," by Col. G. E. Jenks, Watertown Arsenal, Watertown, Mass.

"Magnetic Methods of Testing Butt

Welds," by T. R. Watts, research engineer, Westinghouse Research Laboratories.

"Fatigue and Impact Testing of Welded Products," by T. M. Jasper, director of research, A. O. Smith Corp., Milwaukee.

"Welding Inspection," by R. Kraus, supervisor of welding inspection, Westinghouse Electric & Mfg. Co.

An informal dinner will bring the day to a close at which a talking picture entitled "Dynamic America," showing the influence of electrical developments on modern civilization, will be shown. This will be followed by a demonstration of "The Electrical Production and Analysis of Sound and Music," given through the courtesy of the Westinghouse Research Laboratories.

T. D. Lynch, past president of the society, is president of the Pittsburgh district committee under whose auspices the meeting has been organized.

Lamson & Sessions Co., Cleveland, reports an operating profit of \$353,208 during 1930. After deducting depreciation and other charges, there was a net loss from operations of \$84,110.

Interlake Steamship Co., Cleveland, which operates the Lake fleet of Pickands, Mather & Co., reports earnings for 1930 of \$1,702,907, compared with \$2,612,875 in 1929.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36½c.
Structural shapes—	
Angles and beams	3.36½c.
Tees	3.36½c.
Zees	3.36½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.80c.
Per Cent Off List	
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pitts-	
burgh	\$30.00
Rerolling, 4-in. and under 10-in., Youngs-	
town	30.00
Rerolling, 4-in. and under 10-in., Cleve-	
land	30.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	35.00

Sheet Bars	
	Per Gross Ton
(Open Hearth or Bessemer)	
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Slabs	
	Per Gross Ton
(8 in. x 2 in. and under 10 in. x 10 in.)	
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Skelp	
	Per Lb.
(F.o.b. Pittsburgh or Youngstown)	
Grooved	1.80c.
Universal	1.80c.
Sheared	1.80c.

Wire Rods	
	Per Gross Ton
(Common soft, base)	
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00

Prices of Raw Material

Ores	
	Per Gross Ton
Lake Superior Ores, Delivered Lower Lake Ports	
Old range Bessemer, 51.50% iron	\$4.50
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
Per Unit	
Iron ore low phos., copper free, 55 to 58% iron in dry Spanish or Algeria, 8c. to 9c.	
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c.
Manganese ore, washed 52% manganese, from the Caucasus	25c. to 27c.
Manganese ore, African or Indian, 50 to 52%	24c. to 26c.
Manganese ore, Brazilian, 46 to 48%	22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.25
Per Gross Ton	
Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.85 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.65 to .75
Gas slack f.o.b. W. Pa. mines	1.00 to 1.15

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid	80.00 to 85.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 12 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$83.50
75%	130.00
Per Gross Ton Furnace	
10%	\$35.00
11%	37.00
12%	39.00

Bessemer Ferrosilicon	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$25.00
11%	26.00
12%	27.00

Silvery Iron	
	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00
Delivered prices at Chicago are about 50c. a ton below this schedule.	

Other Ferroalloys	
	Per lb. contained metal
Ferrotungsten, per lb. contained metal	\$1.08
del'd carloads	\$1.15 to 1.25
Ferrotungsten, less carloads	
65 to 70% Cr., per lb. contained Cr.	
delivered, in carloads	11.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	24.50c. to 26.00c.
Ferrocromium, 0.05% carbon	26.50c. to 28.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18% Rockdale, Tenn., base per gross ton	\$1.00
Ferrophosphorus, electric 24%, f.o.b. Aniston, Ala., per gross ton	122.50
Silico-manganese, gross ton, delivered	135.00

Fluxes and Refractories

Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 6% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$14.00 to \$14.50
No. 2 lump, Illinois and Kentucky mines	17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	\$2.40

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-Heat	
Duty Brick	Intermediate
Pennsylvania	\$43.00 to \$46.00
Maryland	43.00 to 46.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Illinois	43.00 to 46.00
Ground fire clay, per ton	7.00

Silica Brick	
	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick	
	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick	
	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
	Per Cent Off List
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Machine bolts	.73
Carriage bolts	.73
Lag bolts	.73
Plow bolts, Nos. 1, 2, 3 and 7 heads	.73
Hot-pressed nuts, blank or tapped, square	.73
Hot-pressed nuts, blank or tapped, hexagons	.73
C.p.c. and t. square or hex. nuts, blank or tapped	.73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
 †Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagon nuts	.73
Semi-finished hexagon castellated nuts, S.A.E.	.73
Stove bolts in packages, P'gh	.80, 10, 10 and 5
Stove bolts in packages, Chicago	.80, 10, 10 and 5
Stove bolts in packages, Cleveland	.80, 10, 10 and 5
Stove bolts in bulk, P'gh	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	.80, 10, 10, 5 and 2 1/2
Tire bolts	.60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets	
	Base per 100 Lb.
(1 1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets	
	Per Cent Off List
(1/8-in. and smaller)	
F.o.b. Pittsburgh	.70, 10 and 5
F.o.b. Cleveland	.70, 10 and 5
F.o.b. Chicago	.70, 10 and 5

Cap and Set Screws	
	Per Cent Off List
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws	.80, 10, 10 and 5
Milled standard set screws, case hardened	.80 and 5
Milled headless set screws, cut thread	.75 and 10
Upset hex. head cap screws, U.S.S.S. thread	.85 and 10
Upset hex. cap screws, S.A.E. thread	.85 and 10
Upset set screws	.80, 10 and 5
Milled studs	.70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.66c.
F.o.b. Chicago.....	1.70c. to 1.75c.
Del'd Philadelphia.....	1.94c.
Del'd New York.....	1.93c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Birmingham.....	1.80c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.75c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.70c. to 1.75c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.78 1/2c. to 1.83 1/2c.
Del'd Philadelphia.....	1.85 1/2c.
F.o.b. Coatesville.....	1.75c.
F.o.b. Sparrows Point.....	1.75c.
F.o.b. Lackawanna.....	1.75c.
Del'd New York.....	1.93c.
C.i.f. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.70c. to 1.75c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Bethlehem.....	1.75c.
Del'd Cleveland.....	1.78 1/2c. to 1.83 1/2c.
Del'd Philadelphia.....	1.76c.
Del'd New York.....	1.90 1/2c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.65c. to 1.70c.
Wider than 6 in., P'gh.....	1.55c. to 1.60c.
6 in. and narrower, Chicago.....	1.75c. to 1.80c.
Wider than 6 in., Chicago.....	1.65c. to 1.70c.
Cooperage stock, P'gh.....	1.90c.
Cooperage stock, Chicago.....	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.25c. to 2.35c.
Strips, Cleveland.....	2.25c. to 2.35c.
Strips, del'd Chicago.....	2.35c. to 2.45c.
Strips, Worcester.....	2.50c. to 2.60c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.40c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Jobbing Trade

	Base per Lb.
Smooth annealed wire.....	2.35c.
Smooth galvanized wire.....	2.80c.
	Base per Keg.
Standard wire nails.....	\$1.90
Smooth coated nails.....	1.90
Galvanized nails.....	5.90

To Manufacturing Trade

Bright wire.....	2.20c.
Spring wire.....	3.20c.

To Jobbing Trade

Polished staples.....	2.35c.
Galvanized staples.....	2.60c.
Barbed wire, galvanized.....	2.55c.

To Retail Trade

	Base per Lb.
Bright wire.....	2.30c.
Smooth annealed wire.....	2.40c.
Smooth galvanized wire.....	2.90c.
	Base per Keg.
Standard wire nails.....	\$2.00
Cement coated nails.....	2.00
Galvanized nails.....	4.00
	Base per Lb.
Polished staples.....	2.45c.
Galvanized staples.....	2.70c.
Barbed wire, galvanized.....	2.65c.
Woven wire fence per net ton.....	\$65.00

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

Base per Lb.

No. 10, blue annealed, f.o.b. P'gh.....	1.90c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.00c.
No. 10, blue annealed, del'd Phila.....	2.19c.
No. 10, blue annealed, B'ham.....	2.06c.

Sheets

Blue Annealed

Base per Lb.

No. 13, f.o.b. P'gh.....	2.05c.
No. 13, f.o.b. Chicago dist.....	2.18c.
No. 13, del'd Philadelphia.....	2.34c.
No. 13, blue annealed, B'ham.....	2.20c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.35c.
No. 24, f.o.b. Chicago dist. mill.....	2.45c.
No. 24, del'd Philadelphia.....	2.64c.
No. 24, f.o.b. Birmingham.....	2.50c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	2.60c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago dist. mill.....	3.00c.
No. 24, del'd Cleveland.....	3.08 1/2c.
No. 24, del'd Philadelphia.....	3.24c.
No. 24, f.o.b. Birmingham.....	3.05c.

Continuous Mill Sheets

No. 10 gage.....	1.75c.
No. 13 gage.....	1.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	2.50c. to 2.65c.
No. 28, f.o.b. Chicago dist. mill.....	2.65c. to 2.75c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.30c.
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Long Termes

No. 24, 8-lb. coating, f.o.b. mill.....	3.25c. to 3.35c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate

Base per Bar

Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.30	25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90	30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00	40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity bar Base, 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (1 1/2% Nickel).....	\$0.25
2100 (1 1/2% Nickel).....	0.55
2300 (3 1/2% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.85
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 1/2c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base per 100 Lb.

Spikes, 1/2 in. and larger.....	\$2.80
Spikes, 3/4 in. and larger.....	2.80

Spikes, boat and barge.....	\$3.00
Tie plate, steel.....	1.90
Angle bars.....	2.70
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	73 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Steel		Iron	
Inches	Black	Inches	Black
1/2 to 3/8.....	47	1 1/2 and 2.....	+11 +36
3/8 to 1.....	53	2 1/2.....	23 5
1 to 1 1/2.....	58	3.....	28 11
1 1/2 to 2.....	62	4 and 4 1/2.....	31 15
2 to 3.....	64	5 1/2 and 6.....	35 18
Lap Weld		Lap Weld	
2.....	57	4 1/2.....	23 9
2 1/2 to 3.....	61	5 1/2.....	28 13
3 and 3 1/2.....	58	6 to 6 1/2.....	30 17
3 1/2 and 4.....	56	7 and 8.....	29 16
4 and 4 1/2.....	55	9 to 12.....	26 11
Butt Weld, extra strong, plain ends		Butt Weld, extra strong, plain ends	
1/2.....	43	1 1/2 and 2.....	+13 +38
3/8 to 1.....	49	2 1/2.....	23 7
1 to 1 1/2.....	55	3.....	28 12
1 1/2 to 2.....	60	4.....	34 18
2 to 3.....	62	5.....	34 18
3 to 4.....	63	6.....	34 18
Lap weld, extra strong, plain ends		Lap weld, extra strong, plain ends	
2.....	55	4 1/2.....	29 13
2 1/2 to 4.....	59	5 1/2.....	34 20
4 1/2 to 6.....	58	6 1/2 to 8.....	33 19
7 to 8.....	54	9 and 10.....	31 17
9 and 10.....	47	11 and 12.....	21 8
11 and 12.....	46		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/2 in.....	38
2 1/2 in.—2 3/4 in.....	46
3 in.....	52
3 1/2 in.—3 3/4 in.....	54
4 in.....	57
4 1/2 in. to 6 in.....	46
	1 1/2 in.....
	1 3/4 in.....
	2 in.—2 1/4 in.....
	2 1/2 in.—2 3/4 in.....
	3 in.....
	3 1/2 in. to 3 3/4 in.....
	4 in.....
	4 1/2 in.....

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.....	61
1 1/4 to 1 1/2 in.....	53
1 3/4 in.....	37
2 to 2 1/4 in.....	32
2 1/2 to 2 3/4 in.....	40
3 in.....	52
3 1/4 to 3 1/2 in.....	48
4 in.....	51
4 1/2, 5 and 6 in.....	40

Hot Rolled

2 and 2 1/4 in.....	38
2 1/2 and 2 3/4 in.....	46
3 in.....	52
3 1/4 to 3 1/2 in.....	54
4 in.....	57
4 1/2, 5 and 6 in.....	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

C. M. Schwab Defends Bonus

Bethlehem Chairman Asks Stockholders for a Vote of Approval at April 14 Meeting

CHARLES M. SCHWAB, chairman of the Board of Bethlehem Steel Corp., has addressed to stockholders a letter describing in full Bethlehem's bonus system, and the payments made under it to the principal executives since 1917.

Mr. Schwab shows that the system and the general results of his administration of it have been free from secrecy by specific references to newspaper comment since 1915, by quotations from his public addresses in which he had referred to Mr. Grace's million-dollar compensation and by the action of Bethlehem's stockholders in 1917 and 1918.

The letter points out that the Bethlehem bonus system is not a new policy in the steel industry. Incentive payments were originated nearly 50 years ago by Andrew Carnegie. Mr. Schwab adopted the principle when he acquired Bethlehem in 1901.

Mr. Schwab states that Mr. Grace has been worth \$1,000,000 a year and

more to Bethlehem in its complex problems of financial and industrial development. Mr. Grace's bonus compensation, based as it is on earnings, has grown only because the earnings of the corporation have increased correspondingly.

The value of the incentive payment system to Bethlehem has been justified by the results, the letter states, pointing to the fact that the corporation in 26 years has grown from a small specialty concern to the second largest steel company in the world; and that the administrative, selling and general expense of Bethlehem, including the bonuses, is less per ton of steel sold than that of United States Steel Corp. and the Youngstown Sheet & Tube Co.

Although the system had already been adopted by the stockholders in 1917, Mr. Schwab asks in his letter that a vote of approval be given his administration of the plan at the annual stockholders' meeting, April 14.

Fabricated Structural Steel

New Projects of 136,000 Tons Swollen by Buildings in Metropolitan Square, New York—Awards 59,000 Tons

NEW projects requiring fabricated structural steel reach a total this week in excess of 136,000 tons, the largest in more than a year. The greater part of the week's new business is contributed by nine buildings requiring 110,000 tons, which will be erected on Fifth Avenue between Forty-eighth and Fifty-first Streets, New York, by the Metropolitan Square Corp. Another sizable project is a third track structure for the Chicago elevated railroad lines, calling for 9000 tons.

Awards of about 59,000 tons are slightly larger than those of a week ago, when the total was 55,000 tons. Most of this week's tonnage is contributed by two contracts, the Metropolitan Life Insurance Building, at Twenty-fifth Street and Madison Avenue, New York, 20,000 tons, and a viaduct and bridge on route 25 for the New Jersey State Highway Commission, 23,000 tons. Another substantial award of the week is 8200 tons of fabricated steel for mill buildings to be erected at Indiana Harbor, Ind., for the Inland Steel Co. Awards follow:

North Atlantic States

NEW YORK STATE, 1000 tons, transmission towers, to Blaw-Knox Co.

NEW YORK, 1080 tons, Y.M.C.A. building at 220 East Forty-seventh Street, to Palmer Steel Co.

NEW YORK, 20,000 tons, building at Twenty-fifth Street and Madison Avenue for Metropolitan Life Insurance Co., to Bethlehem Steel Co.

STATE OF NEW JERSEY, 23,000 tons, bridge and viaduct on route 25, to American Bridge Co.

JAMAICA, N. Y., 150 tons, building for Long Island Press at 168th Street and Jamaica Boulevard, to Allied Bronze & Ornamental Iron Works.

NEW BERLIN, N. Y., 300 tons, building for Unadilla Valley Railway Co., to Belmont Iron Works.

GUN POWDER FALLS, MD., 500 tons, highway bridges, to American Bridge Co.

SAFE HARBOR, PA., 705 tons, intake steel

WORK for Safe Harbor Water Power Corp., to Belmont Iron Works.

PITTSBURGH, 210 tons, two barges for United States Engineer, to Dravo Contracting Co.

The South

COUSHATTA, LA., 1500 tons, bridge, to Mississippi Valley Structural Steel Co.

GRAVEL SWITCH, KY., 700 tons, coal cleaning plant, to Indiana Bridge Co.

Central States

DETROIT, 150 tons, building for bumper and frame division, Chevrolet Motor Co., to Whitehead & Kales Co.

FORT WAYNE, IND., 195 tons, addition to National Life Insurance Building, to Fort Pitt Bridge Works Co.

INDIANA HARBOR, IND., 8200 tons, mill buildings for Inland Steel Co., 2100 tons to McClintic-Marshall Corp.; the remainder to different fabricators.

CHICAGO, 110 tons, Halsted Street bridge by-pass, to Hansell-Elcock Co.

CHICAGO, 700 tons, Verdi School, to A. Bolters Sons, local.

Western States

PORTLAND, ORE., 141 tons, two bridges over Elk Creek, to an unnamed bidder.

POMONA, CAL., 100 tons, Post Office, to Minneapolis-Moline Power & Implement Co.

Canada

TORONTO, 1000 tons, addition to Royal Ontario Museum, to Dominion Bridge Co.

VANCOUVER, B. C., 925 tons, pier for Canadian National steamships, to Western Bridge Co., Ltd.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

STATE OF CONNECTICUT, 300 tons, three bridges.

STATE OF VERMONT, 100 tons, bridge.

NEW YORK, 1000 tons, armory for 369th Infantry at Fifth Avenue and 142nd Street.

NEW YORK, 110,000 tons, nine buildings between Forty-eighth and Fifty-first Streets, Fifth and Sixth Avenues, for Metropolitan Square Corp.

NEW YORK, 200 tons, Christian Science Church at 185th Street and Fort Washington Avenue.

STATE OF NEW YORK, 350 tons, bridge on Sunrise Highway at Rockaway Boulevard.

NEW YORK, 400 tons, four-story addition to New York Orthopaedic Hospital, 419 East Fifty-eighth Street.

NEW YORK, 100 tons, column cores in reinforced concrete building at 157 Chambers Street.

NEW YORK, 400 tons, public school 120, Crest Engineering Co., general contractor.

YONKERS, N. Y., 800 tons, high school.

WHITE PLAINS, N. Y., 1200 tons, building for Court House and offices.

CENTRAL ISLIP, N. Y., 150 tons, town hall.

STATE OF DELAWARE, 1000 tons, highway bridges.

WASHINGTON, 1200 tons, Klingle Street bridge; bids opened March 3.

The South

STATE OF TEXAS, 800 tons, highway bridges.

Central States

CHICAGO, 9000 tons, third track structure for elevated lines.

STATE OF ILLINOIS, 600 tons, highway bridges.

STATE OF IOWA, 800 tons, highway bridges.

GUELPHINGTON RAILROAD, 500 tons, bridge.

KAUKAUNA, WIS., 225 tons, Lawe Street bridge; bids close March 12.

BABABOO, WIS., 125 tons, State highway bridges in Sauk County; bids close March 10.

MILWAUKEE, 325 tons, Girls' Trade and Technical High School; Wisconsin Bridge & Iron Co., low bidder.

Western States

ASHTON, NEB., 800 tons, bridge across Platte River.

SAN FRANCISCO, 5500 tons, opera house.

SAN FRANCISCO, 300 tons, bridge over Islais Creek; bids March 25.

SAN FRANCISCO, 250 tons, Science Building, Golden Gate Park; Dyer Brothers, low bidders.

SACRAMENTO, 109 tons, bridge over Lytle Creek; bids March 18.

Canada

SASKATOON, SASK., 225 tons, subway for City Council.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Advanced—Tin Firm —Lead Steady—Zinc Stronger

New York, March 3.

Copper

Demand for copper, particularly from abroad, has continued in large volume and prices have again been advanced. On Monday, March 2, Copper Exporters, Inc., increased its quotation from 10.55c. to 10.80c., c.i.f. usual European ports, and the domestic price automatically advanced from 10.55c. to 10.80c. delivered in the Connecticut Valley. Lake copper also increased to 10.50c. to 10.62½c. delivered. It is estimated that the total sales during February approximated 110,000 to 120,000 net tons. Sales to foreign consumers last month are put at about 60,000 gross tons, which compares with 35,000 tons for January and 30,000 tons for December, making February the largest month since last November. An encouraging feature is that, despite the advance, foreign consumers took 2500 tons yesterday and still seem anxious to purchase. Most of the foreign buying is for March and April delivery.

Buying by domestic consumers is by no means light, although most of them are well covered for nearby metal. June delivery has been done in some cases and there are inquiries as far ahead as July, but producers generally are not inclined to book business so far ahead. Opinion is quite general that the statistics for February, out next week, will show a substantial decrease in refined stocks and in production.

Copper Averages

The average price of Lake copper for February, based on daily quotations in THE IRON AGE, is 10.08½c. delivered New York. The average price of electrolytic copper is 9.71c., refinery, or 9.96c., delivered in the Connecticut Valley.

Tin

The feature of the market is the statistics for February. With an increase of 5720 tons for February in the world's visible supply, the total is estimated at 49,339 tons. This is one of the largest on record and its significance is emphasized because February was a short month. Shipments from the Straits were very high last month at 9720 tons, with both the Banca and Chinese shipments at large totals. Deliveries into American consumption were small last month at only 5100 tons. There was another

	THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY					
	Mar. 3	Mar. 2	Feb. 28	Feb. 27	Feb. 26	Feb. 25
Lake copper, New York	10.62½	10.62½	10.37½	10.37½	10.37½	10.37½
Electrolytic copper, N. Y.	10.25	10.25	10.00	10.00	10.00	10.00
Straits tin, spot, N. Y.	26.75	27.00	—	26.90	27.00	27.10
Zinc, East St. Louis	4.05	4.05	4.00	4.00	4.00	3.95
Zinc, New York	4.40	4.40	4.35	4.35	4.35	4.00
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.60	4.60	4.60	4.60	4.60	4.60

*Refinery quotation, price ¼¢ higher delivered in the Connecticut Valley.

substantial increase in stocks of metal in British warehouses, amounting to 403 tons, and the total for the week ended Feb. 28 was 24,974 tons. Had not 100 tons been shipped to the United States, this total would have been larger.

There was some buying early last week, principally by consumers, mostly for far future delivery, with nearby metal included. In London there was buying due to the announcement of the putting into effect on March 1 of the agreement by various governments to curtail production. Doubt, however, prevails in market circles as to whether the plan has yet been made fully operative. In prices, London has again led the advance, and today spot standard is quoted at £122 7s. 6d., future standard at £123 17s. 6d., and spot Straits at £125 12s. 6d. The Singapore market stood at £126 5s. today. In a quiet market here today

spot Straits tin was quoted at 26.75c. New York.

Lead

Prices are firm and unchanged at 4.35c. St. Louis, or 4.60c. New York. Buying has not increased and is confined to carload and small lots for fairly early delivery.

Zinc

Last week sales of prime Western zinc approximated 5000 tons, which was considered a good business under present conditions. Due to this buying and also to the disinclination of most producers to meet prevailing low prices, the quotation has advanced to 4.05c. East St. Louis, or 4.40c. New York. The price of ore is unchanged at \$24 to \$25 Joplin. Production last week was lower, at 6400 tons, and shipments are reported as 6702 tons, making the estimated surplus about

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	27.67½c.
*Copper, hot rolled, base sizes	20.87½c.
Seamless Tubes—	
Brass	20.50c.
Copper	22.87½c.
Brass Rods	13.87½c.
Brazed Brass Tubes	25.50c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.00c. to 30.00c.
Tin, bar	30.00c. to 31.00c.
Copper, Lake	11.75c. to 12.25c.
Copper, electrolytic	11.50c. to 12.00c.
Copper, casting	11.25c. to 11.75c.
Zinc, slab	5.50c. to 6.50c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.50c. to 8.50c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 25.00c.
Solder, ½ and ¼	19.75c. to 20.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	31.00c.
Tin, bar	32.00c.
Copper, Lake	11.25c.
Copper, electrolytic	11.30c.
Copper, casting	11.00c.
Zinc, slab	5.50c.
Lead, American pig	5.35c. to 5.50c.
Lead, bar	8.00c.
Antimony, Asiatic	11.00c.
Babbitt metal, medium grade	15.75c.
Babbitt metal, high grade	25.00c.
Solder, ½ and ¼	19.75c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.50c.	9.50c.
Copper, hvy. and wire	8.25c.	9.25c.
Copper, light and bottoms	7.00c.	8.00c.
Brass, heavy	5.00c.	6.00c.
Brass, light	4.00c.	5.00c.
Hvy. machine composition	7.25c.	8.00c.
No. 1 yel. brass turnings	3.25c.	3.75c.
No. 1 red brass or compos. turnings	4.75c.	7.75c.
Lead, heavy	3.25c.	3.75c.
Lead, tea	2.60c.	2.50c.
Zinc	2.60c.	2.50c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	5.00c.	7.50c.

56,000 tons. Only about 3500 tons was sold, because supplies are strongly held.

Antimony

With demand light, Chinese metal is now available at 7c. to 7.05c., New York, duty paid, for prompt shipment, with futures at 6.75c. to 6.80c.

Non-Ferrous Metals at Chicago

CHICAGO, March 3.—Sales are in large aggregate volume, but consumers show little interest in future needs. The old-metal market is drifting with little to indicate its general direction.

Prices per lb. in carload lots. Lake copper, 19.62¹/₂c.; tin, 27.87¹/₂c.; lead, 4.15c.; zinc, 4.15c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.50c. to 3.75c.; zinc, 1c. to 1.25c.; pewter, No. 1, 14.50c.; tin-foil, 15.50c.; block tin, 21.50c.; aluminum, 6c. to 6.50c.; all being dealers' prices for less-than-carload lots.

Steel Castings Bookings in January Declined

WASHINGTON, March 3.—Orders for commercial steel castings in January totaled 16,631 net tons, or 32 per cent of capacity, against 49,387 tons, or 34.2 per cent, last December, according to reports received by the Bureau of the Census from 132 manufacturers, representing more than 80 per cent of the total capacity of the industry. The January orders consisted of 14,718 tons of railroad specialties and 31,913 tons of miscellaneous castings.

Production in January was 46,156 tons, compared with 46,290 tons in December. The January output comprised 10,943 tons of railroad specialties and 35,213 tons of miscellaneous castings.

Pig Iron and Scrap Survey

Bureau of the Census Announces Consumption Figures for 1929

WASHINGTON, March 3.—Consumption of pig iron by 15 principal consuming industries totaled 41,146,551 gross tons, valued at \$672,170,661 while the scrap consumed was 36,263,591 tons, valued at \$495,275,766, in 1929, according to a special report made public today by the Bureau of the Census.

Steel works consumed 34,364,835 tons of pig iron and 26,498,275 tons of scrap. Blast furnaces used 5,673,176 tons of scrap, and were the next largest source of consumption of old material. Foundries, using their own steel castings, consumed 2,834,565 tons of scrap and were the next largest users of pig iron, having used 3,465,824 tons.

The bureau report says that the industries included in its survey account for all but a small percentage of the total consumption of pig iron and scrap iron and steel. Data for establishments engaged primarily in the production of steel castings for sale as such are included in the figures for steel works and rolling mills, but data for establishments producing steel castings chiefly for their own use in the manufacture of machinery are included in the figures for "Foundries, not elsewhere classified." The last-named industry covers the production of gray and malleable iron castings, whether for use or for sale.

The bureau made an unsuccessful attempt to collect data on the consumption of pig iron and scrap from manufacturers of motor vehicles, but no effort was made to collect data from railroad repair shops.

The accompanying table gives the figures for 15 industries which account for the greater part of the

consumption. Figures in the first column represent the establishments reporting consumption, not the numbers of establishments classified for census purposes in the industries listed, in some of which many establishments do not consume pig iron or scrap.

Joint Meeting of New York Steel Treathers and Welders

A joint meeting of the New York section of the American Welding Society with the New York chapter of the American Society for Steel Treating will be held Monday evening, March 9, in room 1, fifth floor, of the United Engineering Societies Building, 33 West Thirty-ninth St., New York. Three important technical addresses will be delivered during the evening as follows:

"X-Ray Inspection of Welds," by Dr. Ancel St. John, president, St. John X-Ray Service Corp., New York.

"Magnetic Inspection of Steel Products," by Dr. A. V. deForrest, magnetic physicist, Welding Engineering & Research Corp., New York.

"Gamma-Ray Inspection of Heavy Welded Structures," by Dr. R. F. Mehl, Naval Research Laboratory, Anacosta, Md.

The address by Dr. deForrest will include a review of the outstanding developments in the use of magnetic testing in industry, and the one by Dr. Mehl will discuss the development of a new method for the examination of very thick material. Motion pictures and lantern slides will accompany these papers, and discussions and questions are invited.

Industry	No. of Establishments	Pig Iron		Scrap Iron and Scrap Steel	
		Tons (2240 Lb.)	Cost	Tons (2240 Lb.)	Cost
Total	13,113	41,146,551	\$672,170,661	36,263,591	\$495,275,766
Agricultural implements	94	211,875	4,163,171	92,660	1,308,405
Black forgings*	82	1,111,111	17,777,778	5,673,176	32,744,377
Cars, electric and steam railroad	13	48,014	1,051,280	265,829	3,665,132
Cast-iron pipe and fittings	74	1,424,857	23,714,570	217,262	3,033,925
Engines, turbines, tractors and water wheels	55	291,751	6,204,655	179,558	2,733,989
Foundries, not elsewhere classified	2,284	3,165,824	68,974,773	2,834,565	40,240,358
Locomotives	19	21,351	418,535	6,025	95,318
Machine tools	39	65,093	1,351,646	49,512	654,266
Chimney—porcelain lined—water retort—iron	37	235,711	4,445,167	36,260	513,516
Pumps and pumping equipment	61	64,606	1,318,915	29,270	464,975
Ship and boat building, steel and wooden	29	5,129	118,658	1,568	19,405
Steam fittings and steam and hot-water heating apparatus	80	556,397	10,542,338	280,617	4,228,370
Steel works and rolling mills	272	31,364,835	541,558,979	26,498,275	404,059,876
Stoves and ranges	139	344,296	6,636,339	87,265	1,223,655
Textile machinery and parts	30	66,572	1,437,631	29,739	290,202

*The figures in this column represent the numbers of establishments reporting the consumption of pig iron, scrap iron, or scrap steel, not the numbers of establishments classified for census purposes in the industries listed. (The total numbers of establishments classified in some of these industries are considerably larger but many of them do not consume pig iron, scrap iron, or scrap steel.)

*Includes data for cinder, scale, sinter, and open-hearth and Bessemer slag scrap; average cost per ton is therefore much smaller for this industry than for others.

*Includes data for a steel plant operated by an important manufacturer of motor vehicles.

*Includes 13,772,298 tons of scrap iron and scrap steel produced and reworked in steel plants.

March Automobile Output Estimated at 275,000 to 300,000 Units

DETROIT, March 2.

THE spring push for business in the automobile industry has begun. March schedules indicate a substantial acceleration in manufacturing activities, with total production for the month estimated at 275,000 to 300,000 cars. Some of the gain is due to increased retail sales. Another factor is the desire to stock dealers more heavily in anticipation of seasonal improvement in retail trade. This does not mean that automobile makers have any intention of forcing cars on dealers or glutting the market. As winter draws to a close, it is normal procedure for distributors and dealers to have cars ready for quick delivery to customers as business picks up.

Most manufacturers have developed their own barometers for judging whether their models really are selling; the result is that there is little likelihood that the industry will let itself slip into the unfavorable position of a year ago, when dealers had on hand about 125,000 more cars than today. These excess stocks have been worked off to the satisfaction of both factories and dealers, and everything will be done to keep inventories of finished cars as low as is compatible with good business practice.

Almost every automobile company is expected to contribute to this month's betterment. The Ford Motor Co. is said to have tentatively set 100,000 units as its goal, although this is subject to revision as the month progresses. There are some reports that its output will pass that mark by a considerable margin. Some departments at the Rouge plant are working three days a week, others four days, and the final assembly line five days. It should be noted, however, that the final assembly line produces cars only for this district and is merely equivalent to any branch assembly plant; therefore, it involves only a comparatively small number of men.

Several Companies Are Stepping Up Production Schedules

CHEVROLET is planning on 78,000 cars, thus bettering the rate at which it has run since the first of the year. The various Chrysler subsidiaries, especially Dodge Brothers Corp., have had a good run of busi-

March automobile production in United States and Canada estimated at 275,000 to 300,000 cars.

* * *

Factory schedules for March are said to be: Ford, 100,000 (possibly higher); Chevrolet, 78,000; Chrysler subsidiaries, 30,000; Oakland-Pontiac, 12,000; Willys-Overland, 10,000.

* * *

Free wheeling probably will be adopted by additional manufacturers in 1932; also may gain favor in the truck field.

* * *

Sheet and strip mills continue to receive generous specifications from automobile makers.

ness and consequently should show a sharp upturn this month. It is understood that total assemblies may be 25,000 to 30,000 units. Willys-Overland has announced that a favorable turn in sales has necessitated scheduling about 10,000 cars for March. This company was reported to have had a temporary setback in February, but will stage a recovery of lost ground this month. Oakland-Pontiac continues to make a gain with output in March at 12,000 units. About 70 per cent will be Pontiacs and the remainder Oaklands. Hudson, which has been making only 1800 to 1900 cars a week, is taking a spurt and may top 10,000 before the end of the month.

Hupmobile has stepped up production somewhat to about 90 cars a day, five days a week, but still has not kept pace with the performance of other companies. Lincoln is turning out perhaps 30 cars a week. Cadillac is doing well with 110 cars a day, five days a week. Assemblies are said to be well distributed among the eight and 12-cylinder jobs and the LaSalle. The V-16 naturally is limited because it is in the de luxe class. Auburn is reported to have its new assembly line at Auburn, Ind., ready ahead of schedule and will make some 5000 cars in March. It has announced that it has on hand 7000 unfilled orders. Packard is holding up fairly well at 80 to 90 cars a day, four days a week. Graham-Paige is now at 125 units

daily on a five-day basis. Combined production at the Nash plants will run 4000 to 4500 for the month.

Parts Makers Increase Output; Steel Orders More Liberal

IN line with the industry's speeding up process, parts makers have had to increase output. Briggs Body and Murray Body are getting heavier releases; so are the wheel companies. Fisher Body plants, of course, have benefited from the relatively strong positions of General Motors subsidiaries. There is some talk about an important automobile builder drawing in to its own plant the manufacture of some parts now contracted for from outside sources. This is not taken too seriously, however, for in the past it has followed this practice at certain times, abandoning it as soon as production demands made it advisable to farm out the work.

Steel mills making sheets and strips continued to receive generous specifications in the past week from the automotive industry. Thus, February ended with the sales picture the brightest in months. One company booked twice as much business in this territory in February as in January, another showed a 60 per cent gain, a third had a 20 per cent increase. It is notable that most of the improvement centered in the automobile industry, although a few other consuming lines, including electric refrigeration, bought larger quantities of steel.

Employment Situation Still Serious in Detroit Area

DESPITE many reports that employment in Detroit is much better than it was a few months ago, this is not the case. Labor suffered a blow the middle of December, when many factories shut down for inventories and the holidays, from which it did not recover until the middle of February. That is, the total number of men employed in local automobile plants in January was less than on Dec. 15 and did not get back up to the December figure until Feb. 15. In light of the depression, comparisons with 1921 are inevitable. They reveal that only once—last July—did the number of workers in Detroit fall under the peak in 1921. This seems very encouraging until one remem-

bers that the automobile industry has expanded tremendously in the past decade and Detroit's population has shown a corresponding growth. Even though automobile production is showing definite signs of recovery, it is significant, and serves as a reminder that all is not well, that the city is housing free of charge some 4000 homeless men in two municipal lodges, is serving two meals a day to 14,000 penniless men, and is expending \$2,000,000 a month for the total or partial support of 40,000 local families.

Railroad Rates for Transporting Automobiles May Be Reduced

RAILROADS are said to be on the verge of getting back some of the finished automobile traffic which they have lost in the last few years to "contract carrier" truck companies. Traffic heads of all railroads operating in Eastern Trunk Line territory have had several meetings with representatives of automobile manufacturers and have had facts pertaining to present delivery costs put before them. The result is that railroads are about to put into effect a considerable reduction in rates. The new tariffs must take into account not only the bare transportation expense, but also the extra cost of loading automobiles into freight cars and blocking them and of unloading and delivering them to the dealer's place of business. The automobile people are reported to be in a receptive mood so far as rate proposals are concerned and may even favor the railroads if the total cost is slightly higher than if trucking were used.

Use of Free Wheeling on All Cars Predicted for 1932

WHAT is the future of free wheeling? Some men in the automobile industry feel that in one form or another it will be extended until practically all cars have it. They predict that most 1932 models will possess it as standard equipment. There is discussion regarding its application to trucks. General opinion is that it may gain favor in that field, but will not grow in popularity as fast as in the passenger car division. Far-seeing automobile engineers look for radical changes in design in the coming years. One of the most talked-about recommendations is putting the engine in the rear. At the recent meeting of the Society of Automotive Engineers the fact was brought out that wind-tunnel tests have proved that motor cars are being built with the wrong end forward. A leading authority, L. Clayton Hill, declared that individually mounted lamps and other equipment which tends to develop wind resistance will disappear. "These things," he said, "will be built into the car. We will gradually lead the public up to accepting this by first slipping the lamps into the radiator, then into the bonnet and finally the fenders into the lamps. Soon the pub-

lic will see the whole front end of the car made as one stream-lined unit. Then some day somebody is going to get nerve enough to turn the seats around and push the car the other way."

ALTHOUGH one automobile company has switched to cast iron brake drums on its heaviest models, strip steel makers are hoping to forestall tendency in that direction on the part of other customers by trying to develop a comparatively inexpensive alloy steel which will meet requirements. Now that production is more numerous of motor cars which can be driven at 75 to 90 or 100 miles an hour, the braking problem becomes increasingly serious. The strain which a brake must bear in bringing a car to a stop from such high speeds is terrific; there has been some complaint by manufacturers that the comparatively thin strip steel brake drums are not adequate to take care of this condition. Despite the action already taken by one company, it is believed that strip steel mills will find a satisfactory solution for the difficulty.

Bar Iron Wage Rate Is Unchanged

The wage rate on bar iron will remain unchanged for March and April as based on a 1.70c. card, according to an agreement reached between the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers. The rate is based on the average selling price of bars in the January-February period and entitled puddlers to a wage rate of \$10.30 a ton.

Ore Imports Drop Off Again

Incoming iron ore in January is reported by the Department of Commerce at 149,686 gross tons, a falling off of 15 per cent from the December total of 175,920 tons, and, with the exception of the small tonnage in November, the lowest figure since December, 1927. About 74 per cent of the January total came from Chile.

Compared with January, 1930, the shrinkage in incoming ore tonnage was nearly one-half, imports from the chief source of supply dropping about 40 per cent. Cuba, which sent 17 per cent of the total a year ago, sent none this time. Sweden and French Africa,

which between them sent 44,000 tons a year ago, accounted for none this year.

Engineers Plan Visit to Southern Steel Plant

An all-day trip to the works of the Tennessee Coal, Iron & Railroad Co. has been planned in connection with the semi-annual meeting of the American Society of Mechanical Engineers, to be held at Birmingham April 20-23.

From the ore mines the visitors will be taken over the "High Line" railroad which was built for the transportation of ore from the mines to the steel mills. At the Fairfield works the new blast furnace, the power plants, the new open-hearth and the coke plant will be open for inspection; an interesting feature of this installation is the reduction of manual handling to a minimum. A barbecue luncheon will be served en route. The trip is scheduled for Wednesday, April 22.

By-Product Coke Output Up Slightly in January

WASHINGTON, Feb. 27.—With an output of 3,092,153 net tons, the January production of by-product coke marked the first definite check in a progressive decline that prevailed since last April. The same was true of pig iron production in January. The Bureau of Mines points out that daily average production of by-product coke in January was 99,747 tons, a gain of 0.5 per cent over the December daily average of 99,267 tons. The production of beehive coke in January is estimated at 163,000 tons, a decrease of 4.7 per cent when compared with the December output. One new by-product installation was placed in operation in January, the Consolidated Gas Co. adding a battery of 37 Kopper ovens. This was partly offset by one plant which discontinued operations on Jan. 1.

Pioneer employees of the E. C. Atkins & Co., Indianapolis, saw manufacturers, held their twenty-fifth annual smoker recently. Members of the organization of pioneer workers number 223, all of whom have spent 20 years or more in the service of the company.

Sources of American Imports of Iron Ore

	(In Gross Tons)		
	January, 1931	December, 1930	January, 1930
Spain	11,727	6,500	7,700
Sweden .....	.....	9,026	13,501
Canada .....	.....	.....	.....
Cuba .....	.....	.....	49,000
Chile	111,714	107,283	187,114
French Africa .....	.....	7,000	30,520
Other countries	26,245	46,111	5,000
Total	149,686	175,920	292,835

PERSONALS

WILLIAM B. TODD has been appointed general manager of sales of the Jones & Laughlin Steel Corpn. to succeed the late C. S. Bradley. Before joining the Jones & Laughlin sales staff as manager of sales of the cold-finished division in 1922, Mr. Todd for a number of years had been affiliated with the Union Drawn Steel Co., Beaver Falls, Pa., and was a vice-president of it. Since March 1, 1930, he has been assistant general manager of sales, in charge of the company's automotive business.

J. F. GRISWOLD has been named president and a member of the board of Foote Brothers Gear & Machine Co., succeeding W. C. DAVIS. A. B. WILDER also has been named a member of the board. Other new officers elected are: Vice-president, F. A. EMMONS; secretary and treasurer, A. L. GRAY; assistant treasurer, J. R. FAGAN; and assistant secretary, O. R. MOSS. W. A. BARR and H. A. BATES were reelected vice-presidents.

ALLEN R. HOFFER and JOHN B. PARTRIDGE, who have been associated for several years in the iron and steel scrap business in Philadelphia as the Allen R. Hoffer Co., have dissolved partnership. Mr. Hoffer has been appointed manager of a new Philadelphia office to be opened in the Pennsylvania Building by the Schiavone-Bonomo Corpn., New York, and Mr. Partridge will become connected with the Philadelphia office of the Charles Dreifus Co. He was with that company for many years prior to the formation of the Allen R. Hoffer Co.

CHARLES F. BARNDT, formerly general manager, Hamilton Metalplane Co., Milwaukee, has been appointed general manager of the Great Lakes Aircraft Corpn., Cleveland, division of the Allied Motor Industries.

JAMES S. WITMER, since 1920 general sales manager, J. I. Case Co., Racine, Wis., has been appointed assistant to C. RAY MESSINGER, new president of the Oliver Farm Equipment Co. Mr. Witmer became associated with the Case threshing machine works in 1902.

DWIGHT C. BUFFUM, vice-president, Wallace Barnes Co., Bristol, Conn., spoke on the treatment of betterments and renewals at the monthly meeting of the Hartford, Conn., chapter of the National Association of Cost Accountants on Feb. 24.

JAMES A. WRIGHT, director of sales, and THOMAS M. DARRAGH, treasurer, have been made directors



William B. Todd

of the Indian Motorcycle Co., Springfield, Mass.

R. W. REID, former vice-president and general manager of the Beardsley & Wolcott Mfg. Co., Waterbury, Conn., has been elected president to succeed MASON T. ADAMS, who will devote his entire time to the Seth Thomas Clock Co., Thomaston, Conn. Mr. Reid is also a director of the Taft-Pierce Mfg. Co., Woonsocket, R. I.

WALTER W. BRICKA, general manager and a director of the Goodell-Pratt Co., Greenfield, Mass., will leave the company on March 31. Mr. Bricka, who is an associate of the Ellery A. Baker Co., industrial managers, New York, has for the past two years managed the Goodell-Pratt Co. and is terminating his services with the merger of the Goodell company and the Millers Falls Co.

W. KIMBALL LEACH, formerly general manager of the General Alloys Co., Boston, has been elected first vice-president. He has been with the company since 1923.

E. P. GREIST, general manager, Chicago Railway Equipment Co., will speak on "New Developments in Malleable Iron Industry" before a meeting of the Quad-City Foundrymen's Association, at the John Deere Athletic Club, East Moline, Ill., March 16.

HENRY R. JONES, formerly superintendent of the Wilbraham-Green division of the Connersville Blower Co.,

Inc., has severed his connection with the Stacey Engineering Co., of which the Wilbraham plant in Pottstown, Pa., is a part, and has become associated with the General Chemical Co., New York, with headquarters in Pulaski, Va.

J. P. LONG, who has been identified with by-product sales activities of Corrigan, McKinney Steel Co., Cleveland, since the construction of the company's coke plant in 1917, has been advanced to manager of sales, by-product division.

ROY M. ALLEN, consulting metallurgist, is scheduled to address the Detroit chapter of the American Society for Steel Treating, March 9, at the Hotel Fort Shelby, Detroit, on "Cast Iron, Past, Present and Future."

D. C. PRINCE has been made engineer of the switchgear department of the General Electric Co., at Philadelphia. The appointment includes supervision of switchgear research activities at Schenectady.

SAMUEL G. PATTERSON, treasurer, Pittsburgh Valve, Foundry & Construction Co., Pittsburgh, and WILLIAM H. ARNOLD, general sales manager, have been elected vice-presidents of the company. ROBERT F. WATSON has been named assistant secretary and assistant treasurer, and E. J. DIESHER will continue as auditor. As mentioned in THE IRON AGE of Jan. 29, page 435, J. ROY TANNER and GEORGE J. STUART were recently elected president and vice president respectively of the company.

A. C. PEARSON, chairman of the United Business Publishers, Inc., of which THE IRON AGE is a unit, was awarded the medal of the Legion of Honor by MAJOR GEORGES THENAULT, assistant military attaché of the French Embassy, at a ceremony at the Carlton Hotel, Washington, Feb. 23, before a distinguished company. Mr. Pearson was cited for services to France during the World War.

E. M. BARNES has been appointed manager of sales of foundry pig iron by the Gulf States Steel Co., Birmingham. Mr. Barnes was with the Republic Steel Corpn. and its predecessor, the Republic Iron & Steel Co., for nearly 30 years, and had been connected with this company's Birmingham office since April, 1909.

E. F. HASBROOK, formerly assistant purchasing agent for the Chicago, Burlington & Quincy Railroad Co., has been appointed purchasing agent,

succeeding the late J. R. HAYNES. J. P. BLUM has been promoted to assistant purchasing agent.

HERMAN R. NEFF, president, George F. Rider Co., engineer, Cleveland, has been elected director of the Lamson & Sessions Co., succeeding H. L. McNICHOL.

J. M. HUGHES, who has been identified with the Sharon Steel Hoop Co., Sharon, Pa., for many years and for the past few years as superintendent at the company's blast furnace and steel plant at Lowellville, Ohio, has been appointed general superintendent, succeeding W. B. CALDWELL, who has resigned. Mr. Caldwell has been connected with the company for the past 12 years, and, prior to a period spent in Government work during the World War, was associated with the Sharon plant of the National Malleable & Steel Castings Co. E. E. REAGEL, assistant superintendent of strip mills of the Sharon company, has become superintendent, replacing GEORGE W. PFEFFER, who has resigned after a connection of 11 years with the company. E. R. GRIFFITH, who has resigned as traffic manager after 25 years of service, has been succeeded by C. F. McBRIDE.

Railroad Expenditures in 1930 Largest Since 1926

WASHINGTON, March 3.—Aggregating \$872,608,000 capital expenditures made in 1930 by Class I railroads for new equipment, additions and betterments were the largest since 1926, according to complete reports just received from the rail carriers by the Bureau of Railway Economics.

The 1930 expenditures were \$18,887,000 above those of 1930 and \$12,478,000 under those of 1926. Unexpended authorizations representing physically uncompleted work carried over into 1931 from 1930 amounted to \$396,679,000, compared with \$579,005,000, the amount of carryover found on the books of the railroad companies on Jan. 1, 1930.

The amount of capital expenditures devoted in 1930 to purchase of equipment was \$328,269,000, against \$321,306,000 in 1929. Roadway and structures expenditures totaled \$544,339,000, compared with \$532,415,000 in 1929. Capital expenditures in 1930 for locomotives amounted to \$88,494,000, compared with \$70,660,000 in 1929. For freight cars, expenditures amounted to \$181,028,000, compared with \$191,917,000. For passenger cars, capital expenditures amounted to \$44,791,000, compared with \$38,670,000. Capital expenditures for additional track amounted to \$114,486,000, compared with \$129,148,000. For heavier rail, expenditures totaled \$47,101,000, compared with \$46,862,000. For shops and engine houses, including machinery and tools, expenditures totaled \$29,179,000, compared with \$36,561,000.

OBITUARY



BROWN JOYCE

BROWN JOYCE, director, vice-president and general sales manager, the Wallace Barnes Co., Bristol, Conn., died at the Bristol Hospital Feb. 26 after an illness of eight weeks. Mr. Joyce was born Dec. 12, 1890, in Jersey City, N. J. In 1905 he became associated with the American Steel & Wire Co. at New York and later was made assistant sales agent of the flat wire and spring department. In 1917 he applied for service with the United States Government, but because of defective eyesight was unable to enlist. He therefore became purchasing agent for the Turner Construction Co. on the War and Navy Building at Washington, where he spent the year 1918. He then became affiliated with the Wallace Barnes Co., in 1919 becoming district sales manager, with office at Detroit. Shortly afterward he was transferred to Bristol and was made general sales manager, subsequently being advanced to the positions of vice-president and director. In the passing of Brown Joyce the metal-working industry has lost one of the most promising of its younger leaders. His rise to executive position was swift. His ability, geniality and his sympathy with his fellowmen won him the esteem and friendship of all who knew him.

JOHN G. LADBRICK, for 42 years connected with the Cleveland Twist Drill Co., Cleveland, died in Geneva, Switzerland, on Feb. 14, aged 65 years. He came to the United States from Switzerland when he was 17 years old. His first business connection was with the George Worthington Co., hardware jobber, Cleveland. He joined the Cleveland drill company in 1889 and served that company in practically every section of the country. For the past 20 years he had represented the company in the territory west of the Rocky Mountains. Ill health caused him to retire last year.

ADRIAN P. SLOAN, chairman of the board of the Cushman Chuck Co., Hartford, Conn., died of pneumonia at his home at that city, Feb. 21. On Jan. 1 he completed 50 years of service with the company. Born at Tolland, Conn., on May 10, 1847, Mr. Sloan spent his boyhood in that town and went to Hartford at an early age to learn the metal trade. At the age of 15 he enlisted in the Union Army and served throughout the Civil War. Returning to Hartford, he became associated successively with Pitkin Brothers, Colt Patent Firearms Mfg. Co. and the Cushman Chuck Co. Two of his sons are connected with the Cushman company, Harry E. Sloan as president and Adrian Boyd Sloan as secretary and treasurer.

FRANK E. CODDING, who retired a year ago as president of the E. E. Souther Iron Co., St. Louis, with which company he had been connected for 60 years, died recently in a hospital in that city. He was 76 years old. Mr. Coddling was born in Mansfield, Mass., and went to St. Louis as a boy. He entered the employ of the iron company in 1870 and was elected president in 1908.

ORVILLE P. BLAKE, since 1925 Kansas City district sales manager of the Inland Steel Co., died of pneumonia at Denver, Colo., on Feb. 25. He first joined the Inland sales staff in 1906 as manager of the St. Louis office. He represented the company in Washington during the war and returned to Chicago in 1919.

GEORGE J. MOCKLEY, president, South Seattle Foundry Co., Seattle, Wash., and also of the Middle States Foundry Co., Milwaukee, died at his home in Seattle on Feb. 24, aged 72 years. He established the Neenah-Menasha Foundry Co., Menasha, Wis., many years ago, later acquiring an interest in the Liberty Foundry Co., Milwaukee. He then organized the Middle States company, of

which his son, Edward G. Mockley, is secretary-treasurer and manager. Another son, George W. Mockley, is vice-president and manager, South Seattle Foundry Co., which the late Mr. Mockley founded 20 years ago.

MONROE S. CLAWSON, formerly identified with the Plastic Die & Mold Corp., Newark, N. J., died on Feb. 18, aged 63 years. He was a well known electrochemist and was the holder of numerous patents on electric furnaces, plastic molding of dies and permanent molding devices in the foundry.

JOSEPH R. HAYNES, purchasing agent for the Chicago, Burlington & Quincy Railroad, died Feb. 20 of heart disease. He was 62 years old and had been ill about three weeks. Mr. Haynes entered the service of the Burlington in 1887, beginning as a clerk in the purchasing department.

N. H. SHIELS, in charge of the scrap department of the Cincinnati office of Hickman, Williams & Co., died last week, after an operation. Mr. Shiels, who has been with the company for the past three years, was widely known among dealers in old materials.

E. T. JOHN, joint managing director Linthorpedinsdale Smelting Co. and chairman Indian Manganese Co., died Feb. 18, aged 60.

JAMES E. BOYLAN, for many years construction and consulting engineer of the Berlin Construction Co., died suddenly of an apoplectic stroke, on Feb. 18, in the office of the superintendent of schools, Middletown, Conn.

MICULI I. MORRIS, a member of the firm of Dalkoff Iron & Metals Co., Rock Island, Ill., died on Feb. 8, aged 69 years. He came to this country from Lithuania more than half a century ago and after a short period of residence in Chicago moved to Rock Island.

A. R. PYOTT, vice-president, Pyott Foundry Co., Chicago, died on Feb. 11. He was a graduate of the Engineering School of the University of Michigan and had been an official of the company for about five years.

JOHN A. NICHOLS, formerly general superintendent Corigan, McKinney Steel Co., Cleveland, died on Feb. 12 at his home at La Jolla, Cal., aged 66 years. He became connected with the Corigan, McKinney company, in 1914 and previously had been with the Carnegie Steel Co. He retired in 1927.

JOSEPH H. JOLLEY, member of the firm of J. H. Jolley & Co., Philadelphia, brass and copper dealer, died in that city on Feb. 15, aged 68 years.



L. M. Wainwright

LUCIUS MORTON WAINWRIGHT, president, Diamond Chain & Mfg. Co., Indianapolis, died at Miami Beach, Fla., on Feb. 21, aged 71 years. He became president of the Central Cycle Mfg. Co. in 1890 and 10 years later became identified as manager of the Diamond Chain factory of the American Bicycle Co. In 1905 he organized and was made president of the Diamond Chain & Mfg. Co., which took over the factory of the American Bicycle Co.

HARRY P. READMON, for the past 12 years purchasing agent of the Chicago Pneumatic Tool Co., New York, died on Feb. 26, aged 53 years.

R. J. DOTY, plant manager, Reading Steel Casting Co., Reading, Pa., died of angina pectoris in that city on Feb.



R. J. Doty

21. About a month ago he had been nominated a director of the American Foundrymen's Association.

MICHAEL J. KILLEEN, formerly assistant superintendent of the Edgar Thomson blast furnaces of the Carnegie Steel Co., died in St. Francis Hospital, Pittsburgh, on Feb. 19, aged 73 years. He was born in England, but established his residence at Hubbard, Ohio, 46 years ago. He was associated with the Edgar Thomson works for more than 30 years, and had contributed numerous improvements and innovations to blast furnace practice.

Ohio Foundrymen Hear Talk on Safety

Safety education was the keynote of an interesting talk at a sectional meeting of the Ohio Foundrymen's Association held at Toledo, Feb. 27. The attendance was very good, there having been about 65 northwestern Ohio foundrymen present. The meeting was presided over by A. H. Kramer, Dayton, president of the association, and was held at the Toledo Yacht Club.

The safety talk was made by A. D. Lynch, Ohio Brass Co., Mansfield, who took for his subject the moral responsibility of industrial and business management for safety training and education. He stressed the need of training shop employees along safety lines, holding that this educational work is of more importance than providing guards for machinery. Safety work, he said, had not kept pace with the progress in industry that has resulted in faster operating machinery and new hazards. It is not necessary, he said, for a plant to have a safety engineer to take charge of safety work or to make any additional outlay of money for its educational safety work. The speaker outlined briefly the plan used in the plant of the Ohio Brass Co., where 10 per cent of the workers in each department are members of a safety committee under a department chairman, the members of the committee being changed from time to time so that all employees serve on the committee.

H. M. Lane, Detroit, discussed recent improvements in foundries to reduce costs, and Pat Dwyer of Foundry, Cleveland, talked on meeting present-day competition.

Teachers of machine design in colleges and technical schools have formed a "clearing house," the purpose of which is to exchange problems in machine design, research data, ideas, as to methods of teaching machine design and other information of mutual interest. Material contributed by the members is sent to the chairman, Prof. Frank L. Eidmann, Columbia University, and mimeographed copies are distributed to members.

February Iron Output Up 10 Per Cent— Net Gain of Six Furnaces

PIG iron production in February registered a larger increase than in January and the upward trend, started in January, was substantially augmented. Data, gathered largely by wire on Tuesday, March 3, from every operating furnace, show that the increase in daily rate last month was about 10 per cent as compared with 3 per cent in January. A gain in active furnaces was also made.

The February daily rate was 60,950 gross tons which is 5651 tons larger than the 55,299 tons per day in January. This is an increase of

10 per cent. The net gain in active furnaces was six as compared with a gain of seven for January.

Production of coke pig iron in February was 1,706,621 tons or 60,950 tons per day for the 28 days. This contrasts with 1,714,266 tons or 55,299 tons per day for the 31 days in January. The gain in daily rate for February was 5651 tons or about 10 per cent. The corresponding gain for January over December was 1567 tons in the daily rate or 3 per cent. There was a loss in December of 13.7 per cent. The gains in January and

February are the first since April, 1930, for the daily rate and since March, last year, for the net gain in operating furnaces.

The February daily rate is the smallest for that month since February, 1922, when it was 58,214 tons. Each February since 1922 up to February, this year, exceeded 100,000 tons in daily rate.

Net Gain of Six Furnaces

Nine furnaces were blown in during February and only three were blown out or banked. In January, 13 were

Daily Average Production of Coke Pig Iron in the United States
by Months Since Jan. 1, 1927—Gross Tons

	1927	1928	1929	1930	1931
Jan.	106,123	92,573	111,044	91,209	55,299
Feb.	105,024	100,002	114,507	101,390	60,950
Mar.	112,366	103,215	119,822	104,715	.....
April	114,074	106,183	122,087	106,062	.....
May	109,395	105,931	125,745	104,283	.....
June	102,988	102,733	123,908	97,804	.....
½ year ..	107,251	101,763	119,564	100,891	.....
July	95,199	99,091	122,100	85,146	.....
Aug.	95,073	101,180	121,151	81,417	.....
Sept.	92,498	102,077	116,585	75,890	.....
Oct.	89,810	108,832	115,745	69,831	.....
Nov.	88,279	110,034	106,047	62,237	.....
Dec.	86,960	108,105	91,513	53,722	.....
Year	99,266	103,382	115,851	86,025	.....

Daily Iron Production by Districts, Gross Tons

	Feb. (28 days)	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)
New York and Mass.	91,216	99,352	98,448	118,947
Lehigh Valley	40,232	41,033	45,411	32,344
Schuylkill Valley	24,711	25,509	27,792	25,790
Lower Susq. and Lake iron Valley	16,458	18,974	18,375	16,570
Pittsburgh district	356,241	357,128	346,877	425,446
Shenando Valley	35,261	38,929	47,096	50,909
Western Pennsylvania	45,657	40,988	28,656	50,854
Maryland, Va. and Ky.	78,374	82,436	60,803	69,728
Wheeling district	88,372	102,320	111,609	106,782
Mahoning Valley	134,217	75,339	67,131	118,572
Central and Northern Ohio	172,266	184,519	169,575	172,729
Southern Ohio	7,759	26,160	26,139	26,807
Illinois and Indiana	379,547	384,452	386,963	395,814
Mich., Minn., Mo., Wis.	80,152	85,186	101,254	92,627
Colorado and Utah	153,900	150,251	124,650	142,186
Alaska	1,767	1,082	.....	.....
Tennessee .....	.....	.....	.....	.....
Total	1,706,621	1,714,266	1,665,696	1,867,107

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
January, 1931	81,340	19,810	101,390
March	83,000	20,815	104,715
April	85,489	20,573	106,062
May	81,310	19,973	101,283
June	77,882	19,921	97,804
July	66,949	18,197	85,146
August	64,867	16,560	81,417
September	62,242	12,648	75,890
October	57,785	12,043	69,831
November	49,120	12,567	62,237
December	46,952	12,780	53,732
January, 1931	45,883	9,416	55,299
February	49,618	11,332	60,950

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

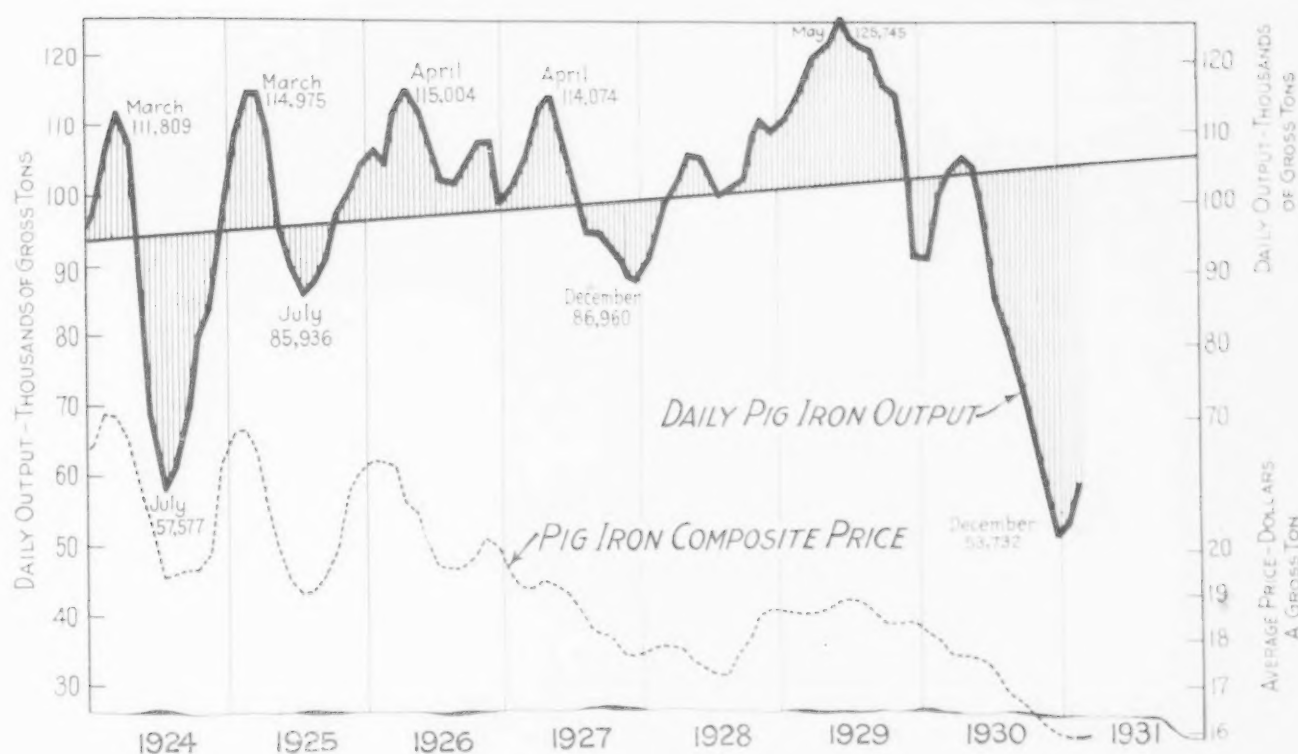
	March 1		Feb. 1	
Furnaces	Number in Blast	Rate of Operation	Number in Blast	Rate of Operation
New York:				
Buffalo	4	2,639	4	2,545
Other N. Y. and Mass.	2	639	2	660
New Jersey	0	.....	0	.....
Pennsylvania:				
Lehigh Valley	1	1,493*	4	1,325*
Schuylkill Valley	2	880	2	820
Susquehanna Valley	1	590	1	610
Ferromanganese	0	.....	0	.....
Lebanon Valley	0	.....	0	.....
Ferromanganese	0	.....	0	.....
Pittsburgh District	20	12,755	18	11,495
Ferromanganese	0	325	2	315
Shenando Valley	2	1,265	2	1,255
Western Pennsylvania	2	1,365	2	1,280
Ferromanganese	2	265	1	200
Maryland	2	2,270	2	2,135
Wheeling District	4	3,150	4	3,150
Ohio:				
Mahoning Valley	8	4,900	6	2,600
Central and Northern	10	6,150	10	6,145
Southern	2	235	3	845
Illinois and Indiana	20	14,070	19	12,900
Mich., Wis. and Minn.	3	1,635	3	1,470
Colo., Mo. and Utah	3	1,240	3	1,195
The South:				
Virginia	0	.....	0	.....
Ferromanganese	1	100	1	100
Kentucky	1	425	1	420
Alabama	10	5,225	10	4,845
Ferro. and spiegel	1	240	0	.....
Tennessee	1	65	1	55
Total	108	61,850	102	57,365

*Includes spiegelisen.

Production of Coke Pig Iron in United States by Months
Beginning Jan. 1, 1929—Gross Tons

	1929	1930	1931
Jan.	3,444,370	2,827,464	1,714,266
Feb.	3,206,185	2,838,920	1,706,621
Mar.	3,714,472	2,246,171	.....
Apr.	3,662,625	3,181,868	.....
May	3,898,682	3,232,760	.....
June	3,717,325	2,934,129	.....
½ year	21,610,360	18,261,312	.....
July	3,785,120	2,639,537	.....
Aug.	3,755,680	2,523,921	.....
Sept.	3,197,564	2,276,770	.....
Oct.	3,588,118	2,164,768	.....
Nov.	3,181,411	1,867,107	.....
Dec.	2,836,916	1,665,630	.....
Year	42,283,769	31,399,195	.....

*These totals do not include charcoal pig iron. The 1929 production of this iron was 138,193 gross tons.



Daily production of pig iron is still somewhat further below needs than in 1924

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 575,000 tons. Inclusion of 1930 in calculating the trend line has lowered it from that previously shown.

blown in and six were shut down.

Of the nine furnaces blown in last month six are credited to independent steel companies with two to the Steel Corporation and one to the merchant classification. Two independent steel company furnaces and one Steel Corporation stack were blown out or banked.

Operating Rate on March 1

On March 1 there were 108 furnaces active having an estimated operating rate of 61,850 tons per day. This compares with 102 furnaces on

Feb. 1 with an operating rate of 57,305 tons per day.

Furnace Changes in February

The following furnaces were blown in during February: One Edgar Thomson furnace of the Carnegie Steel Co., two Aliquippa and one Eliza furnace of the Jones & Laughlin Steel Corp. in the Pittsburgh district; one Cambria furnace of the Bethlehem Steel Corp. in western Pennsylvania; one Hazelton furnace of the Republic Steel Corp. and the Mary furnace in the Mahoning Valley; one

Indiant furnace of the Youngstown Sheet & Tube Co. in the Chicago district; and one Ensley furnace of the Tennessee Coal, Iron & Railroad Co. in Alabama.

Among the furnaces blown out or banked during February were the following: One Edgar Thomson furnace of the Carnegie Steel Co. and one Eliza furnace of the Jones & Laughlin Steel Corp. in the Pittsburgh district, and the Portsmouth furnace of the Wheeling Steel Corp. in southern Ohio.

Possibly Active Furnaces Reduced

Announcement is made of the dismantling of one Farrell furnace of the Steel Corporation in the Shenango Valley. This reduces the total number of possibly active furnaces in the United States from 310 to 309.

Nearly a million dollars was paid to pensioners by the General Electric Co. during 1930. President Gerard Swope has announced. On the last day of the year there were 1287 pensioners, averaging 69.29 years of age and having been employed by the company for an average of 28.77 years before retirement; the ages of the men totaled nearly 90,000 years, and their service with the company totaled more than 37,000 years. Pension payments in 1930 averaged \$817.

Production of Steel Castings in One Gross Ton

	Total Pig Iron Shipped and Produced			Pig Iron Castings*		
	1929	1930	1931	1929	1930	1931
Jan.	2,651,416	2,211,475	1,422,282	28,205	27,260	14,251
Feb.	2,498,901	2,281,244	1,559,594	25,978	21,310	12,480
Mar.	2,939,295	2,609,950	1,600,000	24,978	23,346	11,000
Apr.	2,826,028	2,561,681	1,500,000	22,411	21,777	10,000
May	3,195,494	2,613,628	1,500,000	23,896	20,296	10,000
June	2,899,798	2,594,223	1,500,000	23,354	20,327	10,000
1/2 year	17,010,812	14,582,631	8,500,000	160,839	157,321	60,000
July	3,039,370*	2,675,474	1,500,000	31,010	17,728	10,000
Aug.	3,065,874	2,610,572	1,500,000	28,461	20,969	10,000
Sept.	2,862,799	1,870,269	1,500,000	27,595	21,181	10,000
Oct.	2,962,560	1,791,421	1,500,000	31,193	21,480	10,000
Nov.	2,498,291	1,491,927	1,500,000	31,866	18,619	10,000
Dec.	2,112,794	1,269,529	1,500,000	28,904	16,258	10,000
Year	33,522,840	25,101,753	15,000,000	339,750	276,630	100,000

*Includes output of merchant furnaces.

February Iron Output Up 10 Per Cent— Net Gain of Six Furnaces

PIG iron production in February registered a larger increase than in January and the upward trend, started in January, was substantially augmented. Data, gathered largely by wire on Tuesday, March 3, from every operating furnace, show that the increase in daily rate last month was about 10 per cent as compared with 3 per cent in January. A gain in active furnaces was also made.

The February daily rate was 60,950 gross tons which is 5651 tons larger than the 55,299 tons per day in January. This is an increase of

10 per cent. The net gain in active furnaces was six as compared with a gain of seven for January.

Production of coke pig iron in February was 1,706,621 tons or 60,950 tons per day for the 28 days. This contrasts with 1,714,266 tons or 55,299 tons per day for the 31 days in January. The gain in daily rate for February was 5651 tons or about 10 per cent. The corresponding gain for January over December was 1567 tons in the daily rate or 3 per cent. There was a loss in December of 13.7 per cent. The gains in January and

February are the first since April, 1930, for the daily rate and since March, last year, for the net gain in operating furnaces.

The February daily rate is the smallest for that month since February, 1922, when it was 58,214 tons. Each February since 1922 up to February, this year, exceeded 100,000 tons in daily rate.

Net Gain of Six Furnaces

Nine furnaces were blown in during February and only three were blown out or banked. In January, 13 were

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1927—Gross Tons

	1927	1928	1929	1930	1931
Jan.	100,123	92,573	111,044	91,269	55,299
Feb.	105,024	100,004	114,507	101,390	60,950
Mar.	112,366	103,215	119,822	104,715	.....
April	114,074	106,183	122,087	106,062	.....
May	109,385	105,931	125,745	104,283	.....
June	102,988	102,702	123,908	97,804	.....
7 months	107,351	101,763	119,561	100,891	.....
July	95,199	99,091	122,160	85,146	.....
Aug.	95,073	101,180	121,151	81,417	.....
Sept.	92,498	102,077	116,585	75,890	.....
Oct.	89,810	108,832	115,745	69,831	.....
Nov.	88,279	110,984	106,047	62,237	.....
Dec.	86,960	108,705	91,513	53,732	.....
Year	99,266	103,382	115,851	86,025	.....

Pig Iron Production by Districts, Gross Tons

	Feb. (28 days)	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)
New York and Mass.	91,216	89,352	85,418	118,947
Lehigh Valley	40,232	41,035	45,411	52,344
Schenectady Valley	24,711	25,509	27,793	25,790
Lower Susq. and Lehigh Valley	16,458	18,974	18,375	16,570
Pittsburgh district	306,241	257,128	246,877	425,146
Shenando Valley	35,391	38,929	47,095	50,909
Western Pennsylvania	45,657	40,988	28,656	50,856
Maryland, Va. and Ky.	78,374	82,436	60,802	69,728
Wheeling district	88,372	102,320	111,609	106,782
Macon Valley	124,247	75,339	67,131	118,572
Central and North Ohio	172,266	184,519	169,515	172,729
Southern Ohio	7,739	26,160	26,139	26,807
Illinois and Indiana	378,547	383,453	386,963	395,814
Mich. Minn. Mo., W. Va., Colo. and Utah	89,452	85,186	101,254	83,627
Alabama	135,900	150,251	134,650	142,186
Tennessee	4,767	4,639	.....	.....
Total	1,706,621	1,714,266	1,665,690	1,867,107

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
February, 1931	81,730	19,810	101,390
March	82,900	20,815	104,715
April	85,183	20,879	106,062
May	84,310	19,973	104,283
June	77,882	19,921	97,804
July	66,949	18,197	85,146
August	64,857	16,560	81,417
September	62,342	13,548	75,890
October	57,788	12,048	69,831
November	49,110	12,507	62,237
December	49,952	12,780	55,732
January, 1931	45,883	9,416	55,299
February	48,635	11,315	60,950

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

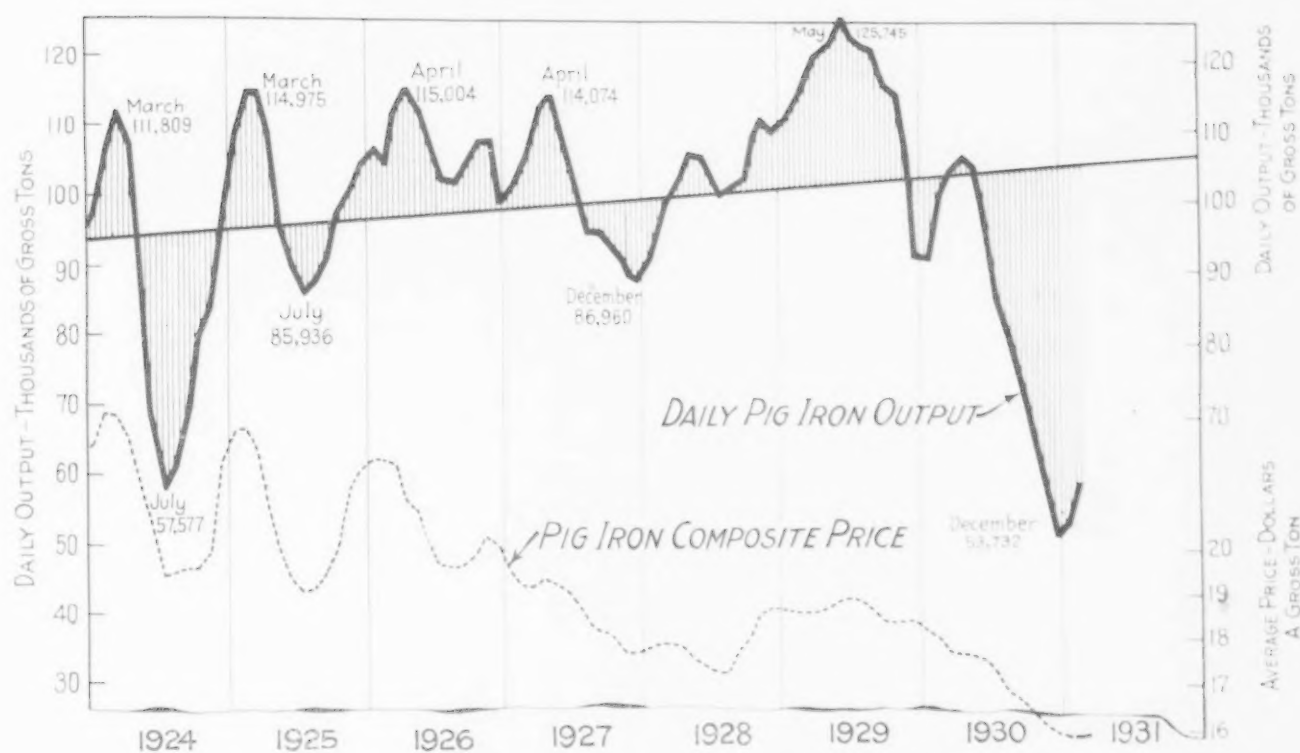
	March 1		Feb. 1	
Furnaces	Number in Blast	Rate of Operation	Number in Blast	Rate of Operation
New York:				
Buffalo	4	2,639	4	2,545
Other N. Y. and Mass.	2	630	2	660
New Jersey	0	.....	0	.....
Pennsylvania:				
Lehigh Valley	4	1,435*	4	1,325*
Schenectady Valley	2	880	2	820
Susquehanna Valley	1	590	1	610
Perrymanshore	0	.....	0	.....
Lebanon Valley	0	.....	0	.....
Perrymanshore	0	.....	0	.....
Pittsburgh District	20	12,755	18	11,495
Perrymanshore	2	325	2	315
Shenando Valley	2	1,265	2	1,255
Western Pennsylvania	2	1,365	2	1,280
Perrymanshore	1	265	1	200
Maryland	3	2,270	3	2,135
Wheeling District	4	3,153	4	3,150
Ohio:				
Macon Valley	8	4,500	6	3,600
Central and Northern	10	6,150	10	6,145
Southern	2	235	3	845
Illinois and Indiana	20	14,070	19	12,900
Mich., Wis. and Minn.	3	1,635	3	1,470
Colo., Mo. and Utah	3	1,240	3	1,195
The South:				
Virginia	0	.....	0	.....
Perrymanshore	1	100	1	100
Kentucky	1	425	1	420
Alabama	10	5,325	10	4,845
Perrymanshore	1	240	0	.....
Tennessee	1	65	1	55
Total	108	61,850	102	57,365

*Includes spiegel.

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1929—Gross Tons

	1929	1930	1931
Jan.	3,444,370	2,827,464	1,714,266
Feb.	3,206,185	2,828,920	1,706,621
Mar.	3,714,472	3,246,171	.....
Apr.	3,682,625	3,181,868	.....
May	3,898,082	3,232,760	.....
June	3,717,225	2,934,129	.....
7 months	21,610,560	18,261,312	.....
July	3,783,130	2,639,537	.....
Aug.	3,755,650	2,523,921	.....
Sept.	3,497,564	2,276,770	.....
Oct.	3,588,118	2,164,768	.....
Nov.	3,181,411	1,867,107	.....
Dec.	2,835,916	1,602,690	.....
Year*	42,285,769	31,399,105	.....

*These statistics include charcoal pig iron. The 1929 production of this iron was 175,193 gross tons.



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Feb. 1 with an operating rate of 57,365 tons per day.

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The following furnaces were blown in during February: One Edgar Thomson furnace of the Carnegie Steel Co., two Aliquippa and one Eliza furnace of the Jones & Laughlin Steel Corp. in the Pittsburgh district; one Cambria furnace of the Bethlehem Steel Corp. in western Pennsylvania; one Hazelton furnace of the Republic Steel Corp. and the Mary furnace in the Mahoning Valley; one

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Production of Steel Castings by the Steel Corp. of America

	Total Pig Iron Shipped and Poured in Castings			Pig Iron Castings*		
	1929	1930	1931	1929	1930	1931
Jan.	2,651,414	2,214,875	1,422,582	24,208	27,266	14,251
Feb.	2,498,991	2,214,224	1,249,394	24,978	21,518	19,480
Mar.	2,549,293	2,506,989	—	24,978	21,518	—
Apr.	2,826,628	2,564,681	—	22,413	21,777	—
May	2,195,494	2,613,628	—	22,896	20,296	—
June	2,898,798	2,604,222	—	25,364	27,327	—
1/2 year	17,010,812	14,582,931	—	166,839	157,224	—
July	3,039,370*	2,675,414	—	31,010	17,728	—
Aug.	3,065,874	2,919,372	—	28,461	20,909	—
Sept.	2,862,729	1,870,269	—	27,593	21,181	—
Oct.	2,902,560	1,791,421	—	31,198	21,480	—
Nov.	2,498,291	1,491,937	—	31,860	18,619	—
Dec.	2,112,704	1,269,329	—	28,564	16,248	—
Year	33,522,840	25,104,763	—	339,280	276,520	—

*Includes output of merchant furnaces.

Gerard Swope Predicts Great Prosperity Era

Stating that American industry is on the threshold of the greatest period of prosperity in its history, Gerard Swope, president, General Electric Co., Schenectady, N. Y., speaking at the annual banquet of the Engineers' Society of Western Pennsylvania, in Pittsburgh on Feb. 26, urged business leaders to devote the greatest attention to fundamental research if they are to be prepared for business advancement. Closer coordination of the sciences, he pointed out, will necessitate the allotment of a definite portion of each year's profits for research and the development of more efficient and more economic methods of manufacture.

Calling attention to the improvements in recent years which have made possible the greater production of electric power with decreasing consumption of energy, Mr. Swope cited the electrification program of the Pennsylvania and other railroads and the increased consumption of electricity in the home as significant of the strides accomplished through practical application of science to industry.

Malleable Castings Orders Gained in January

WASHINGTON, March 3.—Orders for malleable castings in January totaled 32,633 tons, compared with 26,433 tons in December, according to reports received by the Bureau of the Census from 115 establishments. The output was 31,357 tons, or 31.6 per cent of capacity, against 30,431 tons, or 31.1 per cent of capacity. Shipments were 31,638 tons and 27,474 tons, respectively.

Senate Bill Proposes Steel Investigation

WASHINGTON, March 3.—Senator Odell of Nevada, author of a bill to embargo manganese ore and other products from Russia, has introduced a resolution asking for an investigation by the Senate Committee on Judiciary, or a subcommittee, of the business relationship between the steel interests of the United States and those of the Union of Soviet Socialist Republics. It also calls for inquiry regarding the administration of the anti-dumping act by Secretary of the Treasury Mellon and other officials of the Treasury Department and of the consolidation of the Bethlehem Steel Corp. and the McClintic-Marshall Co.

The latter investigation, according to the resolution, is to determine the connection of the so-called Mellon interests with the consolidation.

Senator Odell attacked the Treasury Department in the course of a speech for its order of last week finding that manganese ore is not

being dumped into the United States from Russia.

The resolution provides that the committee make a final report to the Senate not later than Jan. 1, 1932, and authorizes an appropriation of \$10,000 for the investigation. The resolution was referred to the Committee to Audit and Control the Contingent Expenses of the Senate.

Tarentum Steel Corp. Again Plans Financing

Plans for financing the construction of a sheet mill at Tarentum, Pa., by the Tarentum Steel Corp., Pittsburgh, are again being carried forward, according to an announcement by W. B. Cole, vice-president of the company. It is planned to erect the new mill, costing approximately \$1,500,000, on the site of the former No. 2 works of the Pittsburgh Plate Glass Co. at Tarentum.

The Tarentum company was organized late in 1929, but its plans have been postponed from time to time through difficulties in financing resulting from the business depression. A. W. Barrett, vice-president and works manager of the Miller Printing Machinery Co., Pittsburgh, is president of the company. Mr. Cole, the vice-president, was formerly identified with the old West Penn Steel Co., Brackenridge, Pa., which was taken over by the Allegheny Steel Co., Brackenridge, two years ago.

Great Lakes 14-in. Bar Mill Nearing Completion

The National Steel Corp. is completing construction at its Great Lakes plant at Detroit of a 14-in. merchant mill for rolling small shapes and flats, rounds, squares and other merchant sizes. The mill will have a production capacity of 15,000 tons a month. This completes the construction of the Great Lakes plant except for one 10-in. merchant mill, which will be ready for operation about July 1.

The plant has an annual capacity of 650,000 tons of ingots and 890,000 tons of finished steel. The finishing capacity includes the 240,000 tons output capacity of the Michigan Steel Co. plant recently acquired by National Steel to furnish an additional outlet for steel made by the Great Lakes plant.

Orders for pulverized fuel equipment in January totaled 17 pulverizers, having a total capacity of 55 tons of coal per hour, compared with six pulverizers, having a total capacity of seven tons per hour in December, according to reports received by the Bureau of the Census from 11 manufacturers, who are believed to constitute the entire industry.

Navy Asks for Bids on Machine Tools

WASHINGTON, March 3.—Bids have been invited by the Bureau of Supplies and Accounts, Navy Department, for the following machine tools:

March 10. Motor-driven bolt and rivet forging machine, f.o.b. Brooklyn Navy Yard; motor-driven sheet metal cutter machine, for Naval Air Station, Coco Solo, Canal Zone, delivery f.o.b., to Panama Railway Steamship pier 65, New York; motor-driven 12-in. x 6-ft. geared head lathe, f.o.b. Naval Training Station, Great Lakes, Ill.

March 17. 60-ton hydraulic press, f.o.b., Naval Air Station, San Diego, Cal.

Eastern Steel Bonds Sold: Future of Plant in Doubt

A bid of \$208,800 for the bonds of the Eastern Steel Co., Pottsville, Pa., with a face value of \$1,800,000, has been accepted by the bondholders' committee of the company. The purchaser is Samuel K. Phillips & Co., Philadelphia bankers, but no announcement has been made as to the interests which the banking house represents in the transaction. In addition to the \$208,800 paid for the bonds, the purchaser paid \$40,000 as compensation for the services of the bondholders' committee over a number of years.

For the past few years the Eastern Steel Co. has been operated under a receivership. Following the sale of the bonds, the plant was shut down on Feb. 28, and the Federal District Court has been asked to set a date for the sale of the physical assets. Efforts have been made by Pottsville, Pa., business interests to find capital for the taking over and operation of the plant, but it is not certain whether these efforts will prove successful.

Wheeling Steel to Rebuild Portsmouth Furnace

H. A. Brassert & Co., engineers and contractors, Chicago, have been awarded a contract by the Wheeling Steel Corp. for rebuilding its Portsmouth blast furnace. In addition to the remodeling of the top, downcomers, and primary dust catcher, gas cleaning equipment will be installed, consisting of cyclone washer, Brassert disintegrator and eliminator. Two stoves will be relined embodying the principle of uniform velocity. These stoves, it is stated, will have the largest heating surface of any ever built, namely, 210,000 sq. ft.

Otis Steel Co. has appointed the O'Fallon Co., Telephone Building, St. Louis, as its representative in the St. Louis territory. George E. Sevey will continue to act as special representative of the company.

Seek Wider Pittsburgh Zone

Steel Manufacturers Want Larger Switching Area—
Lower Freight Rates Granted

ENLARGEMENT of the Pittsburgh district switching zone is expected to be sought by western Pennsylvania steel manufacturers, following the decision handed down recently by the Pennsylvania Public Service Commission, granting lower short-haul freight rates on iron and steel products in that State and taking exception to the Interstate Commerce Commission's prescribed mileage scale of rates in Official Classification territory, which became effective on May 20, 1930.

The Pittsburgh switching zone is extremely small when compared to the areas granted to shippers in Detroit, Chicago, St. Louis and other cities and the decision made by the State commission in the short-haul rate case indicates that it has the authority to compel the railroads to extend the limits of the switching zone at Pittsburgh. According to traffic officials of Pittsburgh steel companies, papers are already being prepared for filing with the Public Service Commission asking for an extension to the switching area and will likely be placed before it soon.

The Pennsylvania commission's decision providing for a modification in short-haul rates as prescribed by the

Interstate Commerce Commission will save steel shippers and consumers in the Pittsburgh area approximately \$1,500,000 annually, according to traffic officials. While a complete restoration of the old rates, effective before Interstate Commerce Commission's mileage scale went into effect last May, was not granted, Pittsburgh shippers received approximately 75 per cent of their request, and further relief will not likely be sought. While the State commission ordered the new rates to become effective within 20 days, it will likely be a month before new tariffs can be prepared and issued.

The new schedule, like that of the Interstate Commerce Commission now in effect, will be based on a mileage scale varying from 3c. a 100 lb. for distances of five miles and less to 16c. a 100 lb. for distances from 95 to 100 miles. The largest decreases occur in the rates covering distances of less than 50 miles, which were the tariffs most unacceptable to Pittsburgh shippers. Under the schedule now effective, the rate is 6c. a 100 lb. on distances five miles or less, while the proposed rate is cut in half. As the distance increases the percentage reduction declines.

Reinforcing Steel

Awards and Inquiries in Good Volume

NEW reinforcing steel projects, although not as large as those in the previous week, reached a substantial total at 10,500 tons. The largest jobs call for 4000 tons for a street bridge at Los Angeles and 2000 tons for a tunnel in Boston. Letting-totaled 11,100 tons and were swelled by an award of 5000 tons for State highways in Oklahoma. Contracts in February amounted to 20,300 tons, compared with 21,230 tons in January. Awards follow:

ROCKY, 300 tons, Edison Illuminating Co. plant, to Kahman Steel Co.
MAXWELL, N. H., 125 tons, Union Leather Co. plant, to Concrete Steel Co.
HUNGERFORD, MASS., 125 tons, telephone building, to Concrete Steel Co.
NEW YORK, 850 tons, superstructure to New York Central Railroad section of West Side Express Highway, to National Bridge Co.
NEW YORK, 550 tons, subway sections 10 and 11, route 108, awarded by Triest Contracting Corp., to Hay Foundry & Iron Works.
NEW YORK, 100 tons, foundations for West Side Express Highway, awarded by H. H. Sherwin & Co. to Tinscon Steel Co.
NEW YORK, 220 tons, building at 265th

Street yards for Board of Transportation, to Carroll McCrory Co.

NOBLESBORO, PA., 210 tons, sewer in Conquest Steel Co.

LEWISBURG, PA., 1450 tons, Federal penitentiary, to Sweet's Steel Co., Williamsport, Pa.

DAVENPORT, IOWA, 230 tons, Mercy Hospital to an unnamed bidder.

ST. LOUIS, 600 tons, Pierre DeLoe Hospital for St. Louis University, to Laclede Steel Co.

MOBILE, LA., 120 tons, Ursuline Parish school, to Laclede Steel Co.

OKLAHOMA CITY, 5000 tons, highways, Oklahoma State Highway Commission, to Sheffield Steel Corp.

EMERY, ARIZ., 125 tons, bridge over Interstate highway, to an unnamed bidder.

PORTLAND, ORE., 150 tons, oak bridges over Elk Creek, to an unnamed bidder.

SACRAMENTO, CAL., 240 tons, highway work in San Joaquin County, to an unnamed company.

SAN DIEGO, CAL., 150 tons, high school, to an unnamed company.

PASADENA, CAL., 100 tons, Post Office, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 2000 tons, tunnel for city.
CAMBRIDGE, MASS., 145 tons, Massachusetts Institute of Technology, out foundations.

PHILADELPHIA, 300 tons, elementary school at Twelfth and Columbia Streets.

PHILADELPHIA, 200 tons, warehouse for United States Marine Corps.

WASHINGTON, 125 tons, foundation for United States Supreme Court Building, George B. Miller Co. low bidder on general contract.

WASHINGTON, 125 tons, Kinloch Street bridge, bids opened March 2.

PITTSBURGH, 800 tons, substructure for Federal building, Booth & Phipps Co. general contractor.

PITTSBURGH, installed longways, Mellon Institute for Industrial Research, Mellon-Strupp Co. general contractor.

PITTSBURGH, 150 tons, Allegheny County municipal airport, bids to close next week.

HUNTSVILLE, TENN., 250 tons, McKee Street viaduct.

MOBILE, ALABAMA, 100 tons, County Court House.

MIAMI, FLOR., 600 tons, parochial school, W. E. Wood, Detroit, general contractor.

MARIETTA, MISS., 1000 tons, ore dock.

PORT WASHINGTON, ILL., 1000 tons, elevated water reservoir, Detroit contractor low bidder on contract.

CHICAGO, 100 tons, Vaux school, John T. Gaff, general contractor.

CHICAGO, 500 tons, sewage treatment plant for Sanitary District, Heston & A. Healy Co., Detroit, contractor.

CHICAGO, 100 tons, superstructure for Illinois Central Railroad's part of Randolph Street viaduct.

CHICAGO, 100 tons, tanks on College Grove Avenue for Sanitary District, Heston & A. Healy Co., Detroit, contractor.

CHICAGO, 200 tons, Northern Athletic Club.

KRAKENA, WIS., 250 tons, Taylor Street bridge, bids close March 12.

LOS ANGELES, 4000 tons, street bridge, bids March 25.

SACRAMENTO, CAL., 100 tons, highway work in Mendocino County, bids March 28.

Railroad Equipment

Milwaukee Road has ordered eight locomotives from Baldwin Locomotive Works, Auburn, Toledo & Santa Fe, and awarded 10 locomotive tenders to Baldwin Locomotive Works.

Norfolk & Western will rebuild 300 freight cars in its own shop.

Antong Trading Corp. has ordered five 210-2 type locomotives from American Locomotive Co. for shipment to Russia.

Chicago Tank Car Co. is inquiring for one tank car of 10,000-gal. capacity.

Chicago & Eastern Illinois will retire 7284 freight cars. Of these, 286 gondola cars are being scrapped and the remaining 7000 are being offered for sale before being scrapped.

A new use for the non-corroding steel alloys has been found by the Empresa de Telefonos Eriksen, Mexico City, which has just placed an initial order with the Allegheny Steel Co., Brackenridge, Pa., for 3300 lb. of Ascoloy 23 wire for guying telephone poles in regions where the salt air causes rapid corrosion of galvanized wire. Adoption of the alloy for this purpose followed tests made by the Mexican telephone company in December and January.

Machine Tool Trade Irregular

February Brought Improvement to Some Sellers, But a Slight Decline Elsewhere

AS is true of many other lines, machine tool trade of the past month has suggested the possibility of slow, irregular improvement. For some sellers and in certain districts, February was a better month than January in total sales, while the reverse was true elsewhere. Companies which experienced a decided upturn in January are, in most instances, unable to report a sustained improvement for February, although

the shorter month would account for the discrepancy in part.

Inquiries are fairly numerous, and possibly have increased in the past week or two, suggesting that a good many companies are ready to buy whenever their own volume of business shall recommend such a course. It is a common experience of machine tool sellers, however, to make quotations and then find that the prospective buyers are in no hurry to take action.

If there is seasonal improvement in general business during the spring months, machine tool trade may be expected to derive some benefit, although there is normally a lag between a general upward trend and a gain in machine tool orders. However, the element of production cost enters so vitally into all manufacturing programs under present conditions that machine tool orders may respond more quickly than usual.

New York

February did not carry out the promise of continued improvement in machine tool trade that was suggested by the upturn in orders enjoyed by some sellers in January. The past month's business was fairly good with some sellers, but not in all instances were the sales totals as large as those of January. Nothing has occurred to give a very good indication of the trend of the near future. Inquiries are in fair number, but prospective buyers are prone to delay action after receiving quotations. The situation suggests that a good many companies are in readiness to buy if their own volume of business turns upward. March may bring a better indication of what is in store for the machine tool trade than did February.

Chicago

Outstanding inquiries for machine tools continue to increase, but sales are sluggish. In fact, bookings in February were not as large as those in January. However, with inquiries more numerous and March, usually an active month, at hand, dealers are hopeful that business this month will be the best so far this year. The few pending lists are quiet, an exception being the requirements of the Chicago Great Western. With the political atmosphere clearing there is some prospect that action may come on the list for the Austin High School, Chicago. The Chicago Board of Education has ordered two 16-in. band saws. The Colorado Fuel & Iron Co. has augmented its inquiry with a 24-in. throat pneumatic riveter for 3/4-in. structural rivets, and a Milwaukee structural shop is in the market for a radial drill.

Pittsburgh

Machine tool dealers in this district, generally, report a slight improvement in sales last month as compared with those in January, but the gain is far under expectations. Orders were confined mostly to small miscellaneous items with a small margin of profit. Repair parts also figured prominently in recent business.

New inquiry is still coming out in fair volume, but many prospective orders are slow in being placed. Structural steel fabricators and barge builders were expected to be substantial buyers this spring, but thus far have shown little inclination to come into the market. Railroad business is still conspicuously absent.

Milwaukee

The gradual improvement in machine tool business which set in shortly after the turn of the year has continued, and while volume comparable to more nearly normal periods is still lacking, prospects are regarded as promising. Orders are principally for replacement and it is apparent that modernization of shop equipment is increasing. There are some inquiries before the trade that indicate larger buying and considerable business is in prospect from local sources. It is considered significant that the gross orders barometer chart maintained over a period of many years by the Kearney & Trecker Corp., maker of milling machines, has just recorded the first upturn in about 18 months, repeating the history of the 1920-1921 period.

Cleveland

While machine tool orders were scarce the past week, inquiry increased slightly. There is an improvement in

sentiment and a belief that business will show a gradual uptrend during the next few months. Sales in February were better than those in January, although the gain was only slight. A Columbus manufacturer is inquiring for five shapers. Other inquiries are mostly for single machines from widely diversified industries. No inquiry is coming from railroads and very little business from that source is looked for this year.

New York

PLANS are being considered by SCOTT Copper Mining Co., 11 Park Place, New York, for extensions and improvements in plant in Calumet district, Mich., including new sorting plant, rock house, electric-operated pumping plant, compressor plant and other units. Company engineering department will be in charge.

Quartermaster, Governors Island, N. Y., is asking bids until March 16 for a marine-type reversible Diesel engine with auxiliaries.

Officials of Eagle Penell Co., 793 East Thirtieth Street, New York, have announced Eagle Penell Co. of Canada, Ltd., to establish plant at Drummondville, Que., where factory has been secured. Main offices will be at Toronto. Charles G. Boston will be in charge.

Supreme Coal & Ice Co., 531 Nostrand Avenue, Brooklyn, has filed plans for a new ice-manufacturing and refrigerating plant, to cost about \$80,000 with machinery.

Pittsford Bronze & Steel Corp., New York, has been formed by David Baklanoff, 1394 DeKalb Avenue, Brooklyn, and associates, with capital of \$60,000, to operate a plant for manufacture of bronze, brass, steel and other metal products.

Freeport Texas Co., 122 East Forty-second Street, New York, has acquired a controlling interest in Cuban-American

Manganese Corp., Santiago, Cuba, with about 10,000 acres of manganese lands in Oriente Province, near Santiago. Purchasing company is planning erection of mill near Santiago, to operate under a new process, with daily capacity of 1000 tons of ore. It is proposed to have unit ready for service within 12 months. Eugene L. Norton is president of Freeport Texas Co.

Department of Water Supply, Gas and Electricity, Municipal Building, New York, will soon ask bids for a mechanical repair and service building at Tottenville, S. I., to cost over \$70,000 with equipment. Frank E. Wall, 576 Oakland Avenue, West New Brighton, S. I., is architect.

Western Electric Co., 195 Broadway, New York, has plans for a one and six-story addition to Hawthorne Works, Chicago, totaling about 250,000 sq. ft. floor space, for manufacture of loading coils and kindred equipment used in long-distance telephone work, to cost over \$1,500,000. Contract for foundations has been let to W. J. Newman Co., 21 North Curtis Street, Chicago.

Department of Plant and Structures, Municipal Building, New York, is arranging a fund of \$500,000 for extensions and improvements in shops, terminals, piers and other structures, including installation of equipment. Department of Docks, same address, is securing a fund of \$250,000 for similar work in buildings and structures under its direction, and has plans for a new pier 1100 ft. long at West Forty-eighth and Fiftieth Streets, North River, to cost over \$500,000.

American Gas & Electric Co., 30 Church Street, New York, has authorized increase in common stock from 4,000,000

to 8,000,000 shares, part of proceeds to be used for expansion in electric light and power properties.

Grasselli Chemical Co., 256 Vanderpool Street, Newark, has asked bids on general contract for a two-story addition, 42 x 60 ft., to local lithophone and piezometer works, to cost about \$35,000 with equipment. Headquarters are in Guardian Building, Cleveland.

William E. Herbert, 376 Wallington Place, Long Branch, N. J., operating a sheet metal works, has filed plans for one-story top addition to present one-story shop, to cost about \$18,000 with equipment.

Eastern Cutter Salvage Corp., 37-42 Freeman Street, Newark, operating a tool salvage works, has purchased similar businesses of Industrial Salvage Corp., and Haines Tool Co., 6536 Carnegie Avenue, Cleveland. Purchasing company has acquired factory at 30-32 Littleton Avenue, Newark, totaling about 15,000 sq. ft. floor space, and will occupy in a few months, when Cleveland purchases will be concentrated at that location. Additional equipment will be installed. A. B. Abeel is president and secretary.

Board of Education, City Hall, Newark, has secured an appropriation of \$100,000 for equipment for new unit of Newark Public School of Fine and Industrial Art, High and William Streets, now in course of erection and to be ready for occupancy during summer.

John G. Helmers, 147 Summit Avenue, Union City, N. J., architect, has plans for a two-story automobile service, repair and garage building, to cost about \$140,000 with equipment.

Burroughs Engineering Co., Newark,

recently organized by Charles E. Burroughs, 116 Prospect Street, East Orange, N. J., and associates, with capital of \$100,000, plans operation of factory for manufacture of machinery and parts. Walter E. Rahm, 3590 Orange Road, Montclair, N. J., is also interested in new company.

Department of Public Affairs, City Hall, Newark, is asking bids until March 9 for caterpillar tractors and manganese steel parts.

Newbury Mfg. Co., Monroe, N. Y., which recently purchased the J. & B. Foundry Co., Talladega, Ala., will operate Talladega foundry only as a branch, company states, and will not discontinue operations at its Monroe foundry.

Lewyt Metal Products Co., 120 East Thirtieth Street, New York, has been formed as a division of Novelty Wire & Metal Works, which has been engaged in manufacturing metal and wire products for 47 years. New company will specialize in stamped, formed, pressed, welded and fabricated sheet steel products.

South Atlantic

NATIONAL Advisory Committee for Aeronautics—Langley Memorial Aeronautical Laboratory, Langley Field, Va., is asking bids on general contract until March 9 for a hangar at local field, 110 x 220 ft.

Director of Public Buildings and Public Parks, Washington, will soon take bids on general contract for a seven-story Federal supply and distributing

INDUSTRIAL CONSTRUCTION

Electric Railroad Improvements a Feature of Week's Construction News

FOLLOWING in the footsteps of the steam railroads, which recently announced large budgets for extending improvements, the electric railroads have come forward this past week with programs calling for some \$6,000,000. Of this amount, the St. Louis Electric Terminal Railway Co., St. Louis, is responsible for \$5,000,000, which will be spent in erecting and equipping a multi-story, freight terminal, storage, distributing and passenger station. This company is a subsidiary of the Illinois Terminal Railway System of Chicago.

Extending utility projects announced during the week, which will involve work during the remainder of the year and may extend into 1932, amount to \$44,600,000. This is considerably more than the total for the previous week, which was \$17,500,000. The Commonwealth Edison Co. of Chicago makes up nearly half of the week's total in its extension fund of \$20,000,000. This will be used for extensions and improvements to lines and systems, and includes the building of a new substation on Wabash Avenue, Chicago, to cost approximately \$1,000,000. The Consumers' Power Co.,

Jackson, Mich., is also represented with a fund of \$5,400,000 for improvements and extensions to its electric properties in Grand Rapids.

The summary of current projects announced during the week for immediate construction, which involve machinery and equipment in their completion, is as follows:

Public utilities and power plants.....	\$3,550,000
Industrial plants.....	6,455,000
Metal-working plants.....	2,725,000
Railroad improvements.....	6,231,000
Municipal improvements and airports.....	1,566,000
Total.....	\$20,527,000

In addition to the above, new school projects amount to a total of \$1,810,000 for the week. Oil and gas pipe lines reach a total of \$3,150,000. Of this, \$1,500,000 is represented by the contemplated construction of a 265-mile oil line by the Sinclair Consolidated Oil Corp. of New York. This is to run from the oil field district in Rusk County, Tex., to Coffeyville, Kan.

Among the new metal-working plant construction items is one of \$1,500,000 by Western Electric Co. for addition to the Hawthorne Works, Chicago.

plant, 214 x 498 ft., to cost about \$1,700,000 with equipment.

Dixie Culvert & Metal Co., East Point, Atlanta, Ga., has acquired building at 801 Fayetteville Street, Raleigh, N. C., and will establish plant for manufacture of corrugated metal culverts and kindred sheet metal products. Company has acquired certain equipment at plant of Carolina Metal Culvert Co., Salisbury, N. C., for installation at Raleigh plant in addition to other equipment. John L. Sadler is in charge.

Constructing Quartermaster, Fort Monroe, Va., will receive bids until March 23 for two pumping plants for Langley Field, Va.

Roanoke County School Board, Salem, Va., is arranging fund of \$200,000 for new high school at or near Salem, to replace structure recently destroyed by fire, and contemplates installation of manual training equipment. Roland E. Cook is superintendent of schools in charge.

Purcell Co., 11 East Pleasant Street, Baltimore, manufacturer of roofing products, is considering a one-story addition with installation of equipment, to cost about \$25,000.

North Carolina Exploration Co., c/o of R. M. McConnell, Barwell Building, Knoxville, Tenn., has taken over copper mining properties of Fontana Mining Co., near Fontana, N. C., vicinity of Little Tennessee River. Property will be developed for increased output later, including construction of railroad line to Ducktown, Tenn., where ore is now being sent by rail.

Southern Mineral Products Co., Amherst, Va., has work under way on a new mining, sorting and treating plant for handling ilmenite ore, to cost over \$75,000 with equipment. Project will include about 50 homes for a housing development for operatives. Company is a subsidiary of Vanadium Corp., of American Inc., Oliver Building, Pittsburgh.

Inland Waterways Corp., Munitions Building, Washington, is asking bids until March 16 for fabrication and construction of two steel war floats, each 281 ft. long, 34 ft. wide and 10½ ft. deep, with three railroad trucks on depressed deck.

New England

BIDS will soon be asked on general contract by Edison Electric Illuminating Co., 30 Boylston Street, Boston, for new one-story steam power plant for central steam-heating service, to cost over \$700,000 with equipment. Whitney Engineering Co., 250 Stuart Street, is engineer.

Stafford Co., has been organized by Horace A. Hildreth and associates to take over and expand company of same name with plant at Buxville, Mass., manufacturer of textile looms and attachments, and other textile mill equipment. Mr. Hildreth will be president of new organization; Warren E. Farr is treasurer.

Cape Cod Gas Co., 1 State Street, Boston, contemplates a new artificial gas manufacturing plant at Barnstable, Mass., to cost over \$100,000 with equipment.

Board of Education, Hartford, Conn., has authorized installation of a manual training department in new Wallace Thompson School, now in course of erec-

tion at West Hartford. New school will cost over \$250,000. Russell F. Barker, Hartford, is architect.

Board of Works, Pawtucket, R. I., plans installation of boiler and pumping equipment at waterworks station, to cost about \$80,000. A new filtration plant is planned at Happy Hollow reservoir, Valley Falls, to cost about \$500,000 with machinery. Frederick C. Williams, city engineer, is in charge.

Cape & Vineyard Electric Co., Edmonth, Mass., will have plans ready in April for new steam-operated electric power plant unit at Martha's Vineyard, Mass., to cost over \$100,000 with equipment. Company is operated by Associated Gas & Electric Co., 61 Broadway, New York.

Walter J. Goggin, 2 Newsome Park, Jamaica Plain, Boston, and associates have organized New England Aircraft School, Inc., Boston, to establish an aircraft school, with hangars, shops and other mechanical units. Hilding N. Carlsson is president; Mr. Goggin will be treasurer.

Board of Education, Springfield, Mass., has engaged E. C. and G. C. Gardner, 31 Lyman Street, Gardner, Mass., architects, to prepare plans for an addition to technical high school, to cost over \$200,000.

Boston Sand & Gravel Co., 120 Front Street, Cambridge, Mass., is considering erection of a concrete mixing plant.

Somerville Iron Foundry Co., 83 Washington Street, Somerville, Mass., will erect a one-story plant, 55 x 150 ft., to cost \$50,000 with equipment.

Philadelphia

BUILDING permit has been secured by Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, for power plant, to cost \$103,000 with equipment. John T. Windrim, Commonwealth Building, is architect.

United States Marine Corps, Fifteenth and Washington Streets, Philadelphia, has taken bids on general contract for a one-story shop unit.

DuPont Motors, Inc., Broad and Poplar Streets, Philadelphia, manufacturer of DuPont automobiles, with headquarters at Wilmington, Del., has leased building at 611-43 North Broad Street, for a service, repair and sales building.

Lorraine Neon Light Co., Camden, N. J., manufacturer of tube electric-lighting equipment, has leased three-story factory at 331 North Eleventh Street, Philadelphia, for establishment of a plant.

Joseph Shapiro, Philadelphia, has leased building at 1037 Race Street, for new plant for manufacture of cardboard containers and kindred products.

Morris Sklar Co., Philadelphia, has been formed with a capital of \$50,000 to manufacture electric lighting fixtures and electric appliances. Company will take over and expand similar business at 41 North Seventh Street, heretofore operated under name of Morris Sklar. New company is headed by Morris and Louis Sklar, 6930 Larchwood Avenue. Robert E. Coaser, 5929 Walnut Street, is interested in company.

Pennsylvania Water & Power Co., Holtwood, Pa., with main offices in Lexington Building, Baltimore, is disposing of a bond issue of \$3,500,000, part of fund to be used for expansion in power

properties. Company is affiliated with Safe Harbor Power Co., recently organized to construct and operate hydroelectric power plant at Safe Harbor, Susquehanna River. Work on the project is under way and will cost about \$20,000,000.

Armstrong Cork Co., Lancaster, Pa., has authorized expansion and improvements at plant at Beaver Falls, Pa., to cost about \$100,000, including considerable new machinery. E. C. Ridgway is local manager at plant.

Cadillac Motor Car Co., Broad Street and Ridge Avenue, Philadelphia, has leased one-story building, 70 x 24½ ft., to be erected at Upper Darby, for which general contract has been let to William Linker Co., 735 Cherry Street, Philadelphia, for new service, repair and sales building, to cost close to \$100,000 with equipment. Philip S. Tyre, 1520 Locust Street, Philadelphia, is architect.

Chicago

BIDS will be received until March 16 by Sanitary District of Chicago, 307 South Michigan Avenue, Chicago, for West Side sewage treatment works, including two steel digestion tanks, 50 ft. diameter and 35 ft. deep, and 40 ft. diameter and 35 ft. deep, respectively, with digester mechanism; two steel sludge storage tanks, 20 ft. diameter and 37 ft. deep; control house, 25 ft. diameter, and 37 ft. deep; boiler plant, pumps, ejectors and other equipment; plans and specifications on file at Room 600, address noted. Ross A. Woodhull is chairman of committee on finance, in charge.

Peoples Gas Light & Coke Co., 322 South Michigan Boulevard, Chicago, operating artificial gas plants and system with by-product coke plants, has arranged for an increase in capital from \$75,000,000 to \$100,000,000 part of fund to be used for expansion and improvements.

Broadway Body Corp., Chicago, has leased property at 5719-23 Broadway, 75 x 226 ft., for manufacture and repair of automobile bodies.

Iowa Railway, Light & Power Co., Cedar Rapids, Iowa, has authorized a power plant at Sac City, Iowa, to cost about \$65,000 with equipment.

Ellerbe & Co., Minnesota Building, St. Paul, Minn., architects and engineers, will take bids at once on general contract for an eight-story automobile service, repair and garage building, to cost about \$350,000 with equipment.

Commonwealth Edison Co., 72 West Adams Street, Chicago, is arranging a fund of \$20,000,000 for extensions and improvements in plants and system, including transmission lines, distributing lines, etc. Plans are being completed for a power substation on North Wabash Avenue, to cost over \$1,000,000 with equipment. Company engineering department will be in charge.

Miller, Bryant, Pierce & Co., 223 South River Street, Aurora, Ill., manufacturer of carbon papers, etc., has taken bids on general contract for a three-story addition, with additional fourth floor on present factory, to cost about \$80,000 with equipment. Frank D. Chase, Inc., 729 North Michigan Avenue, Chicago, is architect and engineer.

Sampson Oil Co., Bloomington, Ill., is planning new three-story bulk oil storage and distributing plant, with garage and service unit, to cost close to \$100,000

with equipment. W. Brubaker is president.

Montana-Dakota Power Co., 331 Second Avenue South, Minneapolis, Minn., plans extensions and improvements in power plant at Columbus, N. D., to cost over \$250,000 with equipment.

Minnesota Forging Co. has been incorporated by Ralph L. Adkins, Fred P. Stoebe, and Herbert G. Hallin, and has leased drop-forging works of Twin City Forge & Foundry Co., Stillwater, Minn., for establishment of a plant.

Buffalo

PLANS are under way by International Business Machines Corp., Endicott, N. Y., manufacturer of adding and calculating machines, for a four-story and basement addition, 50 x 56 ft., to cost close to \$100,000 with equipment. Company has recently completed another addition at same plant.

King Mfg. Corp., Buffalo, has been organized to take over and expand company of same name with local plant at 254 Kane Street, manufacturer of electrical equipment and appliances.

Department of Correction, State Office Building, Albany, N. Y., will receive bids until March 31 for new foundry, shop and industrial buildings at State prison at Auburn, N. Y. Specifications and plans on file at office of Commissioner of Architecture, address noted.

Commissioner, State Education Department, State Education Building, Albany, N. Y., is asking bids until March 12 for new industrial teachers' training building at State Normal School, Oswego. Plans and specifications at office of Commissioner of Architecture, State Office Building, Albany.

Gross Machinery Co., Inc., Buffalo, has been formed with capital of \$50,000 and 2500 shares of stock, no par value, to take over and expand company of same name with plant at 6 Lock Street, manufacturer of laundry machinery and parts. Incorporators include Richard H. Wile, 566 Richmond Avenue.

Cleveland

OFFICIALS of Steinhilber-Wolfe Construction Co., Fremont, Ohio, including Carl P. Steinhilber and Stanley M. Wolfe, are organizing Aerio Coal Burner Mfg. Co., to operate a plant for manufacture of a new automatic and movable coal burner. Same interests operate Advance Lumber & Supply Co., Fremont.

Bryant Heater & Mfg. Co., 17825 St. Clair Avenue, Cleveland, manufacturer of gas heaters and parts, valves, etc., has engaged Fox, Duthie & Foote, Union Trust Building, architects, to prepare plans for a new one-story plant unit, totalling about 100,000 sq. ft. floor space, on 5-acre tract, to cost over \$200,000 with equipment. It is expected to begin erection in late spring or summer.

Basic Products Co., Oliver Building, Pittsburgh, manufacturer of refractories, has leased plant and properties of Kennedy Refractories Co., Bettsville, near Tiffin, Ohio, including stone quarries, plant and other assets, and will operate as branch works.

Union Metal Mfg. Co., 1432 Walnut Avenue, S. E., Canton, Ohio, manufacturer of metal posts for street-lighting

standards, steel poles, etc., has awarded general contract to Hind Structural Steel Co., 332 Second Street, N. W., for a one-story addition, 60 x 240 ft., to cost over \$60,000 including equipment.

Ohio Brass Co., Mansfield, Ohio, manufacturer of electric railway equipment, has acquired similar branch of business of General Electric Co., Schenectady, N. Y., including overhead materials and equipment for electric railways, electrified haulage equipment, etc. Purchasing company will consolidate with main plant at Mansfield.

Eaton Axle & Spring Co., East Sixty-fifth Street and Central Avenue, Cleveland, is arranging for immediate resumption of production at branch plant at Massillon, Ohio, closed last April, for manufacture of steel springs for trucks and other automobiles.

Fuller Lehigh Co. has transferred manufacturing operations from Fullerton, Pa., to Barberton, Ohio, and general offices from Fullerton to 55 Liberty Street, New York.

St. Louis

BOARD OF EDUCATION, St. Louis, has asked bids on following equipment for Hadley Vocational School: One tool grinder, Oliver 585, a.c. motor-driven; one floor-type grinder, ball bearing, with two 8-in. x 1½-in. grinding wheels, 110 volts, d.c.; one power hack saw, No. 5, 6 x 6-in. capacity, positive lift, draw-cut machine with ½-hp. d.c. motor; one Francis veneer press either No. 36 or No. 6 with ratchet screws; or Yates-American veneer press No. 155; one 12-in. x 4-ft. ball-bearing motor headstock lathe, speed range to be 600 to 3600 r.p.m.

Bids will soon be asked on general contract by St. Louis Electric Terminal Railway Co., 1221 Locust Street, St. Louis, a subsidiary of Illinois Terminal Railway System, 231 South La Salle Street, Chicago, for a terminal storage and distributing plant, freight terminal and passenger station, consisting of multi-story unit, 284 x 298 ft., to cost about \$5,000,000. Mauran, Russell & Crowell, Chemical Building, St. Louis, are architects.

Board of Education, Joplin, Mo., contemplates installation of manual training equipment in new multi-story junior high school, for which bids will be asked on general contract about March 10, to cost over \$250,000. Thomas W. Williamson & Co., Topeka, Kan., are architects.

Oliver P. Greenstreet, Owensville, Mo., and associates have organized Blitz Mfg. Co., with capital of \$50,000, and plan operation of local factory for manufacture of razor blades and kindred steel specialties.

H. P. Wilcox Oil & Gas Co., Tulsa, Okla., operating gasoline properties, has arranged for a preferred stock issue to total \$2,000,000, part of proceeds to be used for expansion and improvements.

Common Council, Garber, Okla., has plans for municipal gas distributing system, with regulators, meters and other equipment, to cost close to \$30,000. V. V. Long & Co., Colcord Building, Oklahoma City, Okla., are engineers.

City Council, El Dorado, Ark., plans erection of municipal airport, with hangar, repair shop and other field units. Jones, Roesele, Oschner & Weiner, Shreveport, La., are architects.

Common Council, Monterey, Tenn., is considering installation of pumping ma-

chinery and other power equipment in connection with extensions in municipal waterworks, for which a bond issue of \$100,000 has been authorized.

City Council, Liberal, Mo., has engaged Stockley Engineering Co., Graphic Arts Building, Kansas City, Mo., engineers, to prepare plans for municipal electric light and power plant, for which a bond issue is being arranged. E. A. Webster is city clerk.

E. A. Lindeman, 1211 West Calhoun Street, Oklahoma City, Okla., is at head of project to build an ice-manufacturing plant, with initial capacity of 100 tons a day, to cost about \$30,000 with machinery.

Nebraska Consolidated Mills Co., Fremont, Neb., is planning early call for bids for addition to grain elevator, including screening, conveying, elevating and other mechanical equipment, to cost about \$85,000.

City Council, Vineta, Okla., has plans for a municipal electric light and power plant to cost \$250,000 with machinery. A special election to vote bonds to amount noted will be arranged. Russell & Axon, 6200 Easton Avenue, St. Louis, are engineers.

Detroit

CONTRACT has been let by Stinson Aircraft Corp., Wayne, Mich., to H. G. Christman-Barke Co., Fishow Building, for two-story addition to aircraft assembling plant, to cost about \$30,000 with equipment.

Bauer Brothers Co., Springfield, Ohio, manufacturer of grinding and separating machinery and parts, has purchased plant and business of Lambert Machine Co., Marshall, Mich., manufacturer of coffee-roasting machinery and kindred equipment, and will consolidate. Production will be concentrated at Springfield plant.

S. E. Winn and H. W. Raymond, Lapeer, Mich., formerly identified with Lapeer Trailer Corp., with local plant, are organizing a company to manufacture motor trailers and parts. Property will be secured and plant established at early date. Joseph Kuttler, Lapeer, is also interested in new organization. Trailmobile Co., Inc., Thirty-first and Robertson Streets, Cincinnati, operating Lapeer Trailer Corp., is considering dismantling of local plant and removal of equipment to make works at Cincinnati, where production will be expanded.

City Council, Iron River, Mich., has called a special election to approve a bond issue of \$12,000, for purchase of pumping machinery and auxiliary equipment for municipal water system. P. M. Youngs is city engineer.

Consumers Power Co., Jackson, Mich., is arranging fund of \$5,407,000 for extensions and improvements in power properties and system in Grand Rapids, Mich., section, including transmission lines. Company engineering department is in charge. John A. Cleveland is district manager at Grand Rapids.

Boas Fishin' Expander Corp., 125 West Washtenaw Street, Lansing, Mich., has been organized with a capital of \$25,000 to manufacture automobile parts and equipment, pistons, etc., and will operate local plant. New company is headed by Ross Gibson and Hugo Lundberg.

Board of Water Commissioners, 733 Randolph Street, Detroit, will receive bids until March 24 for power plant struc-

tures for new waterworks station at Dearborn, including three-story pumping plant, 30 x 63 ft.; three-story switch house, 43 x 220 ft.; one-story turbine plant, 130 x 185 ft.; boiler plant, 125 x 134 ft.; two-story machine shop, storage and distributing unit, and garage, 96 x 210 ft. George H. Penkell is general manager and chief engineer.

Detroit Brass & Malleable Works, Wyandotte, Mich., has filed plans for a one-story addition, to cost about \$40,000 with equipment.

Baker Auto Parts, Inc., Flint, Mich., has arranged for an increase in capital from \$25,000 to \$200,000 for expansion.

Gulf States

PLANS are being considered by Sinclair Consolidated Oil Corp., 45 Nassau Street, New York, for new crude oil pipe line from oilfield district in Rusk County, Tex., to connection with line from Oklahoma City, Okla., and thence to Coffeyville, Kan., about 265 miles long, to cost over \$1,500,000 with booster pumping plants and other structures. Company also contemplates pipe line for like service from east Texas district to oil refinery on Houston ship channel, Houston, Tex., to cost over \$800,000. Company engineering department will be in charge.

Southern Ice & Utilities Co., Paris, Tex., will carry out expansion at local plant, including installation of electric power and other equipment. Joseph Garner is local manager, in charge.

Louisiana Power & Light Co., New Orleans, is disposing of a bond issue of \$5,000,000, part of fund to be used for expansion and improvements in power plants and system. Company is operated under direction of Electric Bond & Share Co., 2 Rector Street, New York.

Luling Oil & Gas Co., Luling, Tex., is planning natural gasoline extraction plant in Refugio fields, Refugio, Tex., to cost over \$75,000 with machinery. Company has applied for permission to erect a carbon black plant in same vicinity, utilizing waste natural gas from fields noted, to cost over \$100,000 with air compressors and other machinery.

Grade School District, Crane, Tex., contemplates installation of manual training equipment in new two-story high school to cost about \$125,000, for which bonds have been approved. Peters, Strong & Bradshaw, Big Spring, Tex., are architects.

Magnolia Petroleum Co., Dallas, Tex., a subsidiary of Standard Oil Co. of New York, 36 Broadway, New York, will arrange bond of \$550,000 for new pipe line from eastern Texas oil pools to present trunk line from Smackover and El Dorado, Ark., including booster pumping stations and other structures. Company engineering department is in charge.

Day-Nite Sign Service, Inc., 824 North Second Street, Temple, Tex., manufacturer of metal signs, is planning new one-story plant, 60 x 120 ft., including metal-working department for production of wrought iron sign specialties, including pipe and pipe-bending department, to cost over \$25,000 with equipment. H. H. Harrison is secretary.

West Texas Utilities Co., Abilene, Tex., is arranging for expansion and improvements, including extensions in power facilities, transmission lines, power sub-

stations and other facilities, to cost over \$250,000 with equipment.

United States Property and Disbursing Office for Louisiana militia bureau, New Orleans, is asking bids until March 12 for one-story storage and distributing plant for field equipment, gun shed, truck storage building and field artillery magazine; specifications on file at office, 729 St. Charles Street.

George E. Bryant, 1263 Liberty Street, Beaumont, Tex., and associates have organized B. & A. Welding & Machine Co., and plan operation of local machine works, including welding division.

Banner Ice Co., Abilene, Tex., has plans for a new ice-manufacturing plant at San Angelo, Tex., where building recently was acquired, to cost over \$45,000 with machinery. O. D. Dillingham is head.

National Vego Gas Corp., 4609 Camp Bowie Boulevard, Fort Worth, Tex., is planning a one-story addition to mechanical plant, primarily for production of sheet metal products, to cost over \$25,000 with equipment.

Swift & Co., Union Stock Yards, Chicago, have plans for a new three-story packing plant addition, 95 x 120 ft., at Mobile, Ala., to cost over \$100,000 with machinery. A refrigerating plant will be installed.

Burnett's Roller and Tank Works, Thomasville, Ga., is inquiring for two water tube boilers, two mechanical stokers and a water softener, all used equipment.

Milwaukee

PLANS are being made by Zenith Mfg. Corp., 619 Center Street, Milwaukee, manufacturer of Ford and Chevrolet replacement cylinder heads, automotive equipment, airplane carburetors, etc., for an addition to cost about \$115,000, including equipment. Work is to be undertaken about April 1. Orders on hand exceed those at any time in fully 18 months.

Great Lakes Coal & Dock Co., 228 Plymouth Building, Minneapolis, expects to act soon on bids recently taken for new electrically operated coal dock costing about \$150,000, on Albion Bay, Superior, Wis. Roland C. Buck, Inc., Superior, is consulting engineer.

Common Council, Monroe, Wis., has authorized bond issue of \$54,000 for erection and equipment of municipal sewage disposal plant, plans for which have been completed by Lewis H. Kessler, consulting engineer, Williams Bay, Wis., and William S. Shields, associate engineer, 232 North Wells Street, Chicago.

Board of Education, Madison, Wis., will take bids about April 1 for two new units of East Madison High School, one for manual arts, 73 x 165 ft., two stories and basement. Frank Riley, 22 West Dayton Street, local, is architect. Fred W. Erickson is secretary of board.

Northwestern Electric & Machinery Co., 692-700 National Avenue, Milwaukee, manufacturer of electric motors and equipment, has changed its corporate title to Hyden Co. There is no change in ownership. Hyman Meyer is president and treasurer.

Village Board, Oakfield, Fond du Lac County, Wis., has authorized bond issue of \$10,000 for erection and equipment of

municipal waterworks plant. Engineer will be selected at once. H. W. Warren is village clerk.

Pittsburgh

APPLICATION for a permit has been made by Gulf Refining Co., Fifth Avenue, Pittsburgh, for construction and operation of a river terminal for oil service on Monongahela River, near Bravosburg bridge, including pipe lines, handling facilities, etc.

National Lead & Oil Co., 1376 Riverside Avenue, Pittsburgh, plans rebuilding part of plant recently destroyed by fire, with loss close to \$40,000 including equipment.

Pittsburgh Terminal Coal Corp., Wabash Building, Pittsburgh, is planning erection of a new coal-washing plant at Avella, Pa., to cost close to \$400,000 with machinery. Pittsburgh & West Virginia Railroad Co., Pittsburgh, is interested in project.

Officials of American Austin Motor Car Co., Butler, Pa., are organizing Austin Miles Corp., to establish service, repair and parts replacement plants in different cities for running and maintenance of fleets of Austin automobiles for large purchasers. Initial works will be established at Detroit to handle from 500 to 1000 cars under a two-year contract. C. W. Brandt, Francis Palms Building, Detroit, is company engineer.

United States Engineer Office, Huntington, W. Va., is asking bids until March 16 for constructing London lock and appurtenances on Great Kanawha River, about 24 miles from Charleston, W. Va.

Midwest Box Co., 111 West Washington Street, Chicago, manufacturer of corrugated paper, fiber and other shipping containers, has leased building in course of erection at plant of Owens-Illinois Glass Co., Huntington, W. Va., for new branch plant for manufacture of corrugated paperboard containers for glass company noted, with initial output of about 50,000 containers a day.

Board of Public Education, Administration Building, Pittsburgh, will receive bids until March 17 for boilers, stokers, unit heaters, etc., for addition to Knoxville high school. H. W. Cramblet is secretary.

Cincinnati

SUPERSTRUCTURE is under way by Buckeye Foundry Co., 2257 Buck Street, Cincinnati, manufacturer of gray iron castings, etc., for a one-story foundry, 120 x 280 ft., for which general contract recently was let to D. Meinken & Son, 2143 Barnard Street, to cost about \$150,000 with equipment.

Contracting Officer, Wright Field, Dayton, Ohio, will receive bids until March 11 for one motor-driven internal grinder, light assemblies, lamp assemblies, running light connectors, etc., until March 10 for quantity of streamline tie rods.

Board of Education, Oakwood Village, Ohio, contemplates installation of manual training equipment in new two-story junior high school to cost about \$300,000, for which bids will soon be asked on general contract. Schenck & Williams, National Bank Building, Dayton, Ohio, are architects.

Kentucky-Tennessee Light & Power Co., Bowling Green, Ky., has work under way on new steam-operated electric generating plant on Green River, designed for an ultimate capacity of 40,000 kw., of which about 10,000 kw. is scheduled for completion by close of year. New station will cost over \$500,000 with machinery. W. S. Barstow & Co., 50 Pine Street, New York, are engineers in charge.

Hobbs Plating Co., Dayton, Ohio, has plans for a new three-story metal-plating plant, to cost close to \$100,000 with machinery. W. J. Huhn, 204 McClure Street, is architect.

Nashville Gas & Heating Co., 226 Sixth Avenue, North, Nashville, Tenn., has awarded general contract to United Engineers & Constructors, Inc., 112 North Third Street, Philadelphia, for new artificial gas storage and distributing plant, with capacity of 2,000,000 cu. ft., to cost about \$225,000.

City Council, Piquette, Ohio, is considering erection of a municipal electric light and power plant and will secure estimates of cost.

Board of Education, Ashland, Ky., contemplates installation of manual training equipment in new junior high school to cost over \$175,000. Norton Foster, Ashland, is architect.

Indiana

PLANS have been approved by Indiana Electric Corp., Indianapolis, for extensions and improvements in power plant and system at Noblesville, Ind., and vicinity, to cost about \$70,000. J. T. Kester, Noblesville, is company engineer.

Board of Education, Richmond, contemplates installation of manual training equipment in addition to junior high school, to cost close to \$150,000 with equipment. Hamilton, Fellows & Nedval, Tower Court, Chicago, are architects.

Municipal Light and Power Committee, Anderson, is planning extensions and improvements in municipal electric light and power plant, including additional equipment. A local architect has been engaged to prepare plans and specifications. Entire project will cost over \$50,000.

Bleke Metal Products Co., West Fifteenth Street, Auburn, is planning to rebuild part of plant, recently destroyed by fire, with loss over \$22,000 including equipment.

Municipal Light and Power Committee, Washington, is asking bids on general contract for a two-story addition to steam-operated electric power plant, 16 x 115 ft., to cost about \$50,000 with equipment. Engineering department is in charge. J. P. Adkins is manager.

Pohlmeier & Pohlmeier, Central Building, Fort Wayne, architects, have plans for a five-story automobile service, repair and garage building, 60 x 150 ft., to cost over \$125,000 with equipment.

City Council, Richmond, is considering extensions and improvements in municipal electric light and power plant, to cost over \$600,000 with new prime movers and auxiliary machinery.

Sibley Machine Works, South Bend, Ind., has plans by Frank D. Chase, Inc., Chicago, for one-story foundry, 80 x 100 ft.

Canada

ELECTRIC plant at Stratford, Ont., will be reconditioned at a cost of \$20,000, and new transformers will be installed.

Asbestos Insulation Corp., Ltd., Canada Dominion Building, Toronto, will soon start construction on a plant at Belleville, Ont. City Council has granted a fixed assessment for 10 years and will put in a railroad siding.

Crescent Wire & Iron Works, Ltd., 650 Dundas Street, Kingston, Ont., will build addition to its plant.

Canada Cement Co., Ltd., Fort Colborne, Ont., will start work next May on a new plant to cost \$200,000. Present buildings will be razed on completion of new works. Contract for equipment has been awarded to B. L. Smith Co., 225 Broadway, New York. L. M. McDonald is superintendent.

Several contracts have been awarded for erection of a 600,000-bcu sugar factory at Petrolia, Ont., for Superior Sugar, Ltd. Frank J. Potter, 1806 Majorswood Avenue, Detroit, is president and engineer.

Hugh & Patrick Paper Co. of Canada, Ltd., 40 Baring Street, Toronto, is contemplating erection of a plant at Haliburton, N. S., for manufacture of papers, to cost \$250,000.

H. H. Eddy Co., Ltd., Bridge Street, Hull, Que., will start work at once on erection of a plant unit, to cost \$100,000. About \$10,000 will be spent on new buildings and equipment in next several years. Victor Tremblay, 350 St. James Street, Montreal, is president. M. Pratt, is architect.

Jenkins Brothers, Ltd., 517 St. René Street West, Montreal, has plans for a foundry at Lachine, Que., for which bids will be called soon. Ross & MacDonald, 601 Belmont Street, Montreal, are architects.

Pacific Coast

APPROPRIATION of \$1,000,000 is being arranged by Los Angeles Gas & Electric Corp., Los Angeles, for expansion and betterments in electric light and power and gas properties, including transmission lines and distributing system, and artificial gas lines. Company engineering department will be in charge.

City of Oakland School District, Oakland, Cal., has awarded a general contract to Strehlow & LeVoie, Alameda, Cal., for a two-story maintenance and repair shop, to cost about \$30,000 with equipment. Building and Grounds Department of School District is in charge.

Consolidated Foundries, Inc., San Francisco, has been organized to take over under one management a group of four Pacific Coast foundries, including Pacific Malleable Castings Co., Oakland; Western Malleable Castings Co., Los Angeles; Steel & Malleable Co., San Francisco; and California Steel Wheel Corp., 147 Eleventh Street, San Francisco. Consolidated organization will carry out expansion program.

Tulare Public Utilities Board, Tulare, Cal., is considering a bond issue of \$3,000,000 for erection of a municipal electric light and power plant and distributing system.

Villa Park Orchards Association, Villa Park, Cal., has plans for a two-story and basement precooling plant addition to

fruit packing plant, to cost \$50,000 with equipment. Herbert A. Brown, 2145 Sacramento Street, Los Angeles, is architect and engineer.

Kilbuck Bay Mill Co., 608 West Spokane Street, Seattle, has awarded a general contract to Austin W. Thayer Horton Building Co. for a two-story addition to mill, to cost close to \$100,000 with equipment.

Pacific Coast Steel Co., Seattle, has filed plans for a structural storage and distributing plant, 31 x 100 ft., to cost \$75,000 with equipment. A crane, now will be installed equidistant of building.

Empire Electric Railway Co., Eugene, Ore., will build an addition to electric railway line from Eugene to Springfield, with branch to Paulina, Ore., to cost \$1,210,000 with equipment, including three 100-ton wheel tractors and tractors.

Washington Canners Cooperative Association, Vancouver, Wash., will soon take bids on general contract for new food plant consisting of main one-story canning unit, 50 x 370 ft., with automatic canning conveying and offset equipment, and one-story storage and distributing unit, 100 x 100 ft., to cost over \$500,000 with equipment. Sutton & Whitney, Lewis Building, Portland, are architects.

Municipal Light and Power Department, Pasadena, Cal., is contemplating an immediate call for bids for a 25,000-hp. turbo-generator unit, with accessory equipment, for addition to municipal electric light and power plant, now under way. New equipment will cost about \$400,000. Benjamin F. DeLoach is general manager.

Crane Co., Chicago, is building an addition, 30 x 60 ft., to its recently completed branch plant 50 x 40 ft., at Los Angeles. A traveling crane will be installed.

Foreign

PLANS are under way by Kraftwerke Co., Stockholm, Sweden, for hydroelectric power station at Kraftwerke Falls on Indal River. Project will include transmission lines to points in northern part of country for power service for iron and steel mills and other industries, with power switching and substation facilities to operate lines at 200,000 volts. Company recently increased capital by 11,000,000 kroner (about \$2,940,000) for expansion.

Post and Telegraph Department, Melbourne, Australia, will receive bids until March 31 for lead-covered cable, telegraph switchboard cable, and single and double-wound resistance spools, etc., until April 7 for testing instruments for cell testing, voltmeters, hydrometers, etc.

Southern Railway Co., Southampton, England, is planning extensions and improvements in local docks and wharves to cost about £3,000,000 (about \$14,610,000), including installation of mechanical handling, conveying and other equipment.

Soviet Russian Government, Moscow, has work under way on a new aluminum plant, Zvanka, at Leningrad, to have an initial annual output of 6000 tons of aluminum, to cost about 30,000,000 rubles (about \$15,000,000). It is scheduled for completion by close of year. Amtorg Trading Corp., 261 Fifth Avenue, New York, is official buying agency. Stuart, James & Cooke, 17 Battery Place, New York, engineers, have contracted with

Soviet Government for technical assistance for design and construction of coal-mining plants at Kharkov in Ukraine, Siberia and other parts of country, including sorting plants, tipplers, storage and distributing plants and other facilities.

To Hold Second Industrial Congress and Exposition

Management, maintenance and materials handling will be discussed at the second National Industrial Congress—termed the Three-M Congress—to be held at Public Auditorium, Cleveland, April 13-17. An industrial equipment exposition will also be held throughout the week.

Contributors to the program include the management and materials handling divisions of the American Society of Mechanical Engineers, the American Management Association, the Society of Industrial Engineers, the Cleveland Electrical Maintenance Engineers Association and the Cleveland Engineering Society.

Handling of ferrous scrap will feature the opening session, which will be under the auspices of the Elimination of Waste Committee and will be followed in the evening by a session on the control of waste. The machinery developments and planning of the Point Breeze, Md., plant of the Western Electric Co. will be outlined at the management session Tuesday afternoon, April 14, while hoist and monorail handling of materials is discussed at a simultaneous session. A drafting department session, a standardization (materials handling) conference, and the first two sessions on marketing are planned for the evening of April 14. The marketing sessions will be under the

auspices of the Society of Industrial Engineers.

Outdoor handling of materials and handling by means of conveyors will feature the afternoon of April 15. In the evening both the materials handling and the management groups will meet; these sessions will include a symposium on trucking and shipping, and will deal with gas and electric trucks and skid platforms.

A maintenance program, to include discussion of costs and wage incentives, has been arranged for Thursday morning, April 16; a simultaneous session on pneumatic handling and small packaging has also been planned. Inspection and maintenance of tools and machinery will be discussed in the afternoon, as well as use of counting devices, etc., on materials handling equipment. Maintenance housekeeping, including painting, lighting, etc., will be taken up at the Friday meeting, while another session will be devoted to belt handling of bulk materials and the use of portable belt conveyors. Daily plant inspection visits are being planned.

Gray Iron Foundry Melt Higher in January

An upward trend in operations in gray foundries in the east central district and to some extent in the East during January is shown in the monthly report of the Gray Iron Institute. Production for all districts during the month, 133 foundries reporting, was 52.1 per cent of normal, compared with 48.5 per cent in January, the normal being the average monthly production during the past three years. New business was 51.4 per cent in January, compared with

47.2 per cent in December, and unfilled orders were 34 per cent, compared with 36.2 per cent during the previous month.

An increase in production to 57 per cent in January, compared with 46.6 per cent, is shown in Pennsylvania, Ohio, Michigan, Indiana and the territory south and west of the Mississippi River. Production in the New England States, New York, New Jersey and Canada increased to 49 per cent from 48.7 per cent in December. Wisconsin, Illinois and the area west of the Mississippi River showed a production of 47.5 per cent, compared with 50.7 per cent in December. The Chicago district reported operations of 38.3 per cent, against 48.8 per cent the preceding month. Nearly the entire increase was shown by foundries of 100 to 250 tons capacity. These operated at 48.9 per cent in January, compared with 49.1 per cent in December.

River Shipments of Steel Increased in January

Shipments of iron and steel products on the Ohio River in the Pittsburgh district during January amounted to 88,089 net tons, according to the United States Engineer office, Pittsburgh. This compared with 50,403 tons during December and with 64,736 tons in January, 1930. On the Monongahela River, steel shipments in January were 90,405 tons, compared with 46,972 tons in the preceding month and with 58,784 tons in January, 1930. Only 50 tons of steel was moved on the Allegheny River in January, while 3800 tons was shipped in December and 100 tons in January of last year.



INDIA USES MORE ALUMINUM

ALUMINUM ware displayed in a Calcutta store includes many utensils unfamiliar to the Occident. Manufacture of aluminum utensils was introduced into India about 1913 with the establishment of plants in Calcutta and Bombay. Certain factories today are equipped with modern machinery and operated by men who learned the craft of metal spinning from their fathers, who worked with brass. Wages are much lower than in Western countries, a "mistri" or skilled craftsman receiving 60 to 90 rupees (\$23.50 to \$32.50) a month.

Germany Seeking to Develop Far Eastern Trade and Investments

(By Cable)

LONDON, ENGLAND, March 2.

THE Soviet Union has invited leading German industrialists to visit the U. S. S. R. and discuss German cooperation in transport improvement plans. A delegation is leaving immediately, which comprises representatives of Otto Wolff & Co., the Vereinigte Stahlwerke (United Steel Works), the Kloeckner and Krupp interests, Demag, the Allgemeine Electricitäts Gesellschaft, Siemens-Borsig and other important works. In the past week the Soviet has placed 70,000 tons of rolled steel with Upper Silesian mills and these orders will probably be increased by an additional 30,000 tons.

German industrialists are now visiting the Far East in an effort to stimulate sales. In this connection, it is noteworthy that a German combination of companies is reported negotiating to expend more than £1,000,000 (\$4,860,000) in erecting plants in the Yangtze Valley and northern China, and a German-Luxemburg combination of interests is reported negotiating to establish a Chinese galvanizing plant.

The Continental Steel Cartel is maintaining the current authorized quota of output until the end of March. The Continental Wire Rod Cartel will meet in Cologne, Germany, tomorrow (Tuesday) to discuss future

Soviet Union buys 70,000 tons of steel in Upper Silesia and invites German delegation from leading interests to discuss transport improvement.

* * *

German trade delegation now visiting Far East to stimulate business and German combination may build plants in China.

* * *

Continental steel mills report better export inquiry and believe price decline has been checked.

* * *

Japan considers merger of 10 steel mills including Government works by Oct. 1 of this year.

Trade in London, in discussing international trade recently, said that the iron and steel industry has requested, not ordinary protection, but, in effect, a prohibitive tariff. It is quite clear, however, that a complete prohibition of imports could not possibly be granted by any government, regardless of its fiscal policy.

The general market situation here is unchanged, with pig iron consumers buying only for immediate needs, and Cleveland furnaces just able to maintain operations. Hematite iron is quieter with a smaller export demand, and domestic consumers awaiting lower prices, in view of the decline in fuel and ore costs.

Steel business is dull and certain large Northeast coast mills are operating only about 30 per cent of capacity. Shipbuilding business is at a low ebb. Continental mills report improved inquiry from Canada, South American markets and the Far East, but so far business is limited and works are still willing to accept low prices.

Tin plate is quiet and mills are suspending as contracts are completed. Stock tin plate has sold at low prices, but certain mills are holding for as much as 16s. (\$3.89) per base box, on tin plate to be manufactured. Galvanized and black sheets continue quiet.

Italian production in January was 40,700 tons of pig iron and 120,000

prices and output. The Polish Nail and Wire Syndicate has been dissolved.

Belgian employers and workers are not yet agreed on the employers' proposed 10 per cent wage reduction and the Government may be asked to arbitrate. The Sambre d'Escaut wire mills are withdrawing from membership in the Belgian Wire Syndicate on May 1, because of quota difficulties.

President Graham of the Board of

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices, f.o.b. United Kingdom Ports

Ferromanganese, export.	£9 0s.	to £11 5s.	\$43.74 to \$54.75
Billets, open-hearth.....	5 5	to 5 10	25.52 to 26.76
Black sheets, Japanese specifications	11 10		55.95
Tin plate, per base box...	0 15½	to 0 15¾	3.77 to 3.80
			Cents a Lb.
Steel bars, open-hearth..	7 15	to 8 5	1.69 to 1.79
Beams, open-hearth.....	7 7½	to 7 17½	1.60 to 1.71
Channels, open-hearth....	7 12½	to 8 12½	1.66 to 1.87
Angles, open-hearth.....	7 7½	to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	8 10		1.84
Galvanized sheets, No. 24 gage	11 0		2.42

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 10s.	to £2 12s.	\$12.15 to \$12.64
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Billets, Thomas (nominal) £3 9s.	to £3 10s.	\$16.77 to \$17.61	
Wire rods, low C., No. 5 B.W.G.	5 2½	to 5 7½	24.94 to 26.15
Rails, light.....	6 0		29.20
Black sheets, No. 31 gage, Japanese.....	11 5	to 12 12	54.68 to 58.32
			Cents a Lb.
Steel bars, merchant....	3 18	to 4 0	0.85 to 0.87
Beams, Thomas, British standard (nominal) ..	3 10	to 3 11	0.78 to 0.79
Channels, Thomas, American sections	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ½-in. thick	3 17	to 3 17½	0.84 to 0.85
Angles, Thomas, 3-in....	3 19½	to 4 0	0.85 to 0.86
Hoop and strip steel over 6-in. base.....	4 10	to 4 11	0.96 to 0.97
Wire, plain, No. 8 gage.	5 12½	to 5 15	1.24 to 1.27
Wire, barbed, 4-pt. No. 12 B.W.G.	9 7½	to 9 10	2.68 to 2.69
Wire nails, base.....	5 17½	to 6 0	\$1.29 to \$1.30
			a keg

tons of raw steel. Italy's December rolled steel output was 106,000 tons, bringing the total production for 1930 to 1,637,000 tons, compared with 1,952,000 tons in 1929.

Luxemburg output in January was 183,000 tons of pig iron and 172,000 tons of raw steel with 25 furnaces in blast at the end of the month.

German and Swiss Aluminum Producers Agree

HAMBURG, GERMANY, Feb. 16.—Following a brief period of intense competition in aluminum between the Swiss and German industries, at which time German domestic and export prices declined 10 to 15 per cent, an agreement has been reached and prices are once more becoming stable. The German Government has previously permitted a certain amount of Swiss aluminum to be imported duty free. The duty free allotment has now been discontinued, and the German aluminum cartel has agreed to sell a certain quantity of Swiss aluminum for export.

European Wage Rates at New Level

HAMBURG, GERMANY, Feb. 16.—Following the recent wage readjustments in the various Continental steel industries, the pay to an open-hearth skilled operative in various countries in the first week of February was as follows: Sweden, 29c. an hr., Germany, 23c., Austria, 20c., France 17c., Czechoslovakia, 16c., Italy, 14c., Belgium, 13½c., Poland 12c., and the United Kingdom, 31c.

The difference in wages in the various producing countries is not so great as appears from a comparison of the rates, because of the variation in cost of living. The highest living costs at present are in Sweden, with Great Britain second and Germany third. The lowest cost of living is in Belgium. In the past two years, surveys of living costs in Europe have shown a decided trend toward equalization in all countries.

Black Sheets and Wire Rods for Far East Decline

HAMBURG, GERMANY, Feb. 16.—Prices of light gage black sheets for Japan have been further reduced by German makers, who recently have quoted £12 7s. 6d. (\$59.84) a metric ton, c.i.f. Japanese ports for No. 31 gage. Quotations on electric and other qualities of sheets have also been reduced. Wire rod quotations for the Far East are declining, as Japan has practically ceased buying and is known to have sold some substantial tonnages to China, shipped from stock. Recent quotations on wire rods have been £6 11s. (\$31.83) a ton, c.i.f. Chinese ports, and £6 9s. (\$31.85) a ton, c.i.f. Japan.

German Steel Works Puts Additional Mill in Operation

(By Radio)

BERLIN, GERMANY, March 2.

Production of pig iron in Germany has declined to 45 per cent, and of steel to 40 per cent of the total output in the same period of 1930. The outlook for steel business, however, is somewhat improved.

Only steel wire is in active demand in the domestic market, but rolling mills report increased inquiries and orders from East Asia and Scandinavian countries. Meanwhile the decline in Continental export prices of steel appears to have been checked.

The Vereinigte Stahlwerke, Dusseldorf, has withdrawn notices dismissing workmen and has placed an additional rolling mill in operation.

The machinery industry is engaged to only about 43 per cent of capacity, and the export outlook for machines and other equipment is unsatisfactory because of the decline in French orders.

At a meeting in Dusseldorf, March 11, the Continental Steel Cartel is expected to provisionally prolong its existence. Meanwhile production of its members continues to be restricted to 30 per cent of the production in October, 1929.

Belgian producers continue to oppose revival of the price-fixing export syndicates which were abandoned last summer.

Plan for Steel Merger in Japan Considered

YOKOHAMA, JAPAN, Jan. 23.—A preliminary plan for the merger of the Japanese iron and steel industry into a single corporation is understood to be under consideration by the special Industrial Rationalization Bureau. The plan proposes the merger of about 10 important Japanese companies, including the Government Steel Works, into a corporation, which shall later include all others.

To accomplish this merger of interests, the plan proposes appointment of an assets committee, immediately after passage by the Imperial Diet of the bill for establishment of such a corporation. This committee would be empowered to inventory and list all assets of the companies entering into the combination. The new corporation would require a working capital of about 100,000,000 yen (\$493,000,000), which would be raised by a bond issue to be officially guaranteed on interest and principal by the Government.

Additional proposals in the plan are understood to be an immediate increase in the duty on pig iron to 11 yen (\$5.42) a ton and a duty on steel of 24 to 25 yen (\$11.83 to \$12.33) a ton, following abolition of the present system of Government subsidies to the steel producers. All loan accounts of

the Government Steel Works would be transferred to the general Governmental accounts. The plan suggests completion of all details of formation of the new corporation by Oct. 1 of this year.

It is further suggested that efforts be made immediately on formation of the new company to improve the equipment of the various subsidiary plants so that cost of pig iron production, which would be about 41 yen (\$20.16) a ton at the inception of the company, would be reduced about 10 per cent, or 4 to 5 yen (\$1.97 to \$2.46) a ton, after which the import duty of 11 yen (\$5.42) a ton could be correspondingly reduced. It is suggested that a foundation committee should handle all details of establishing the new corporation and when formed turn over its affairs to the president and board of directors.

To Make Copper and Brass Scrap Survey

WASHINGTON, March 3.—The Minerals Division, Department of Commerce, has undertaken a survey to trace the origin, recovery and distribution of copper and brass scrap. The study has been instituted at the request and with the cooperation of representative organizations in the trade. The division has sent out a questionnaire to industrial companies, brokers and dealers, by means of which it is hoped to determine the amount of copper and brass scrap entering into domestic industry and exported, its origin by States, counties and cities, the amount purchased and the uses made of it, the form of product in which the copper or brass is purchased, the forms into which it is processed and marketed, and the industry to which the output of plants using the scrap is sold.

Electric Steel Expansion in Central Germany

HAMBURG, GERMANY, Feb. 16.—German producers of electric steel, with plants in the Ruhr, who also operate works in central Germany, have for some time been extending their central German operations as a result of low-priced electric current. In 1913, German output of steel from the electric furnace totaled 97,310 metric tons, and the maximum output was reached in 1918, with a total during the war of 283,000 tons. Last year 138,100 tons of electric steel was made. Certain companies with central German plants are considering the production of electric furnace pig iron, which so far has been commercially made only in Norway, where cheap electric current is available. A plant for producing pig iron may be built soon at Golpa Zschornowitz in central Germany.

Cartels Fail in Objectives

European Attempts to Bolster Prices Have Brought Meager Results, Says Commerce Expert

WASHINGTON, March 2.—The international cartel movement has not been an influential factor in the world price situation during the past year of economic adversities, according to a special report prepared by Dr. Louis Domeratzky, chief of the Bureau of Regional Information, Department of Commerce.

Adverse developments have so weakened the European steel cartel, according to Dr. Domeratzky, that it no longer exists except as a sort of gentlemen's agreement.

With world prices declining, especially on metals, the cartel system offered an unusual opportunity for the exercise of restraining influences or price stabilization efforts, but thus far it has failed to meet the test, the report says.

"Whether the failure of the cartel," the survey continues, "is to be ascribed to a fundamental weakness of the institution itself or to other factors, the fact remains that the existing international cartels have failed to hold back the downward price movement and that efforts to organize new cartels to deal with the price problem have been unsuccessful, on the whole.

"In support of the above assertion we might call attention to the fact that the uncertainties attending the existence of the Continental steel cartel have not yet been eliminated, and that all efforts to build up price-fixing subsidiary organizations have failed; that an international rayon cartel is still as remote as it was a year ago, in spite of the disastrous price decline, and that even the Ger-

man rayon convention has not yet been restored."

Steel Cartel Fails to Become Factor in Price Situation

The Continental steel cartel, Dr. Domeratzky said, was expected at the end of 1929 to become an important factor in the price situation, with indications that some definite action toward the renewal of the arrangement would be taken during 1930.

"Neither of these promises has been

Rapid Rise of Pipe Lines Stressed in I. C. C. Case

WASHINGTON, Feb. 27.—The rapid growth of pipe lines is shown in a decision announced last week by the Interstate Commerce Commission relating to rates on refined petroleum products in the Southwest. A simultaneous opinion covered rail rates on petroleum products throughout the Northwest and from the mid-continent oil refining territory to so-called Official Classification territory, lying east of the Mississippi River and north of the Ohio and Potomac Rivers. The decisions covered a general investigation of the rate structure of petroleum and petroleum products.

The decision covering the rate structure in the Southwest pointed out that in 1920 there were 48,712 miles of pipe lines operated in the

fulfilled," he said. "The attempt to form joint sales organizations for secondary products had to be abandoned, as it was found impossible to exercise sufficient price control."

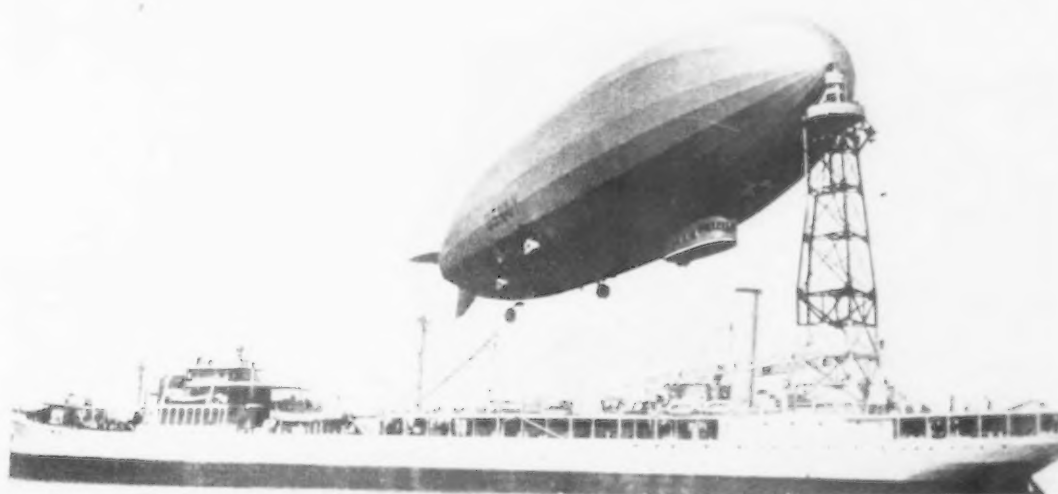
Dr. Domeratzky said the successful effort of two members of the aluminum cartel, Germany and Switzerland, to increase the import duty, ostensibly in order to protect their industries against export activities of American producers through their Canadian subsidiary, stood out during the year. The fact that this cartel found it advisable to pursue a liberal price policy, he added, may be partly responsible for its survival.

Violent fluctuations in price during the last year may be regarded as conclusive evidence of the inability of the copper cartel to control that industry's price situation or the conditions responsible for the disastrous decline.

United States, of which 22,488 miles were in the Southwestern States. In May, 1926, there were 22,480 miles of trunk lines and 21,900 miles of gathering lines within Arkansas, Louisiana, Oklahoma, Kansas and Texas. These trunk lines had a daily capacity of 6,354,400 bbl. The trunk-line mileage and capacity within these States, the commission said, is approximately one-half of the entire United States.

In 1927 there were 749,586,711 bbl. of oil carried by pipe lines in the Southwest, compared with 989,427,028 bbl. carried by the more important pipe line carriers throughout the United States. The latter operated a total of 76,070 miles of pipe lines as compared with 44,330 miles in the Southwest. The decision stated that the total net income of these pipe lines in 1926 and 1927 was over 10 per cent of the investment.

ANOTHER NEW USE FOR STEEL!



THE use of dirigibles by the United States Navy has necessitated the building of dirigible tenders. Here is shown the *Dakota*, tender for the *Los Angeles*, Navy dirigible, taking part in the recent naval maneuvers in Panama Bay. The dirigible is moored to a steel mast at the stern of the ship.

Aid to Business Recovery Seen in Road Building

Highway building this year offers one of the most definite prospects for increasing employment and in a gain in business in the lines most affected by the requirements for road building, according to statements made at a meeting at Town Hall, New York, Feb. 22, at which speakers from five national organizations primarily interested in highway progress were heard.

Dr. Arthur H. Blanchard, president, International Traffic and Transport Association, was chairman of the meeting, and the speakers were Herbert H. Rice, chairman, International Alaskan Road Commission and former

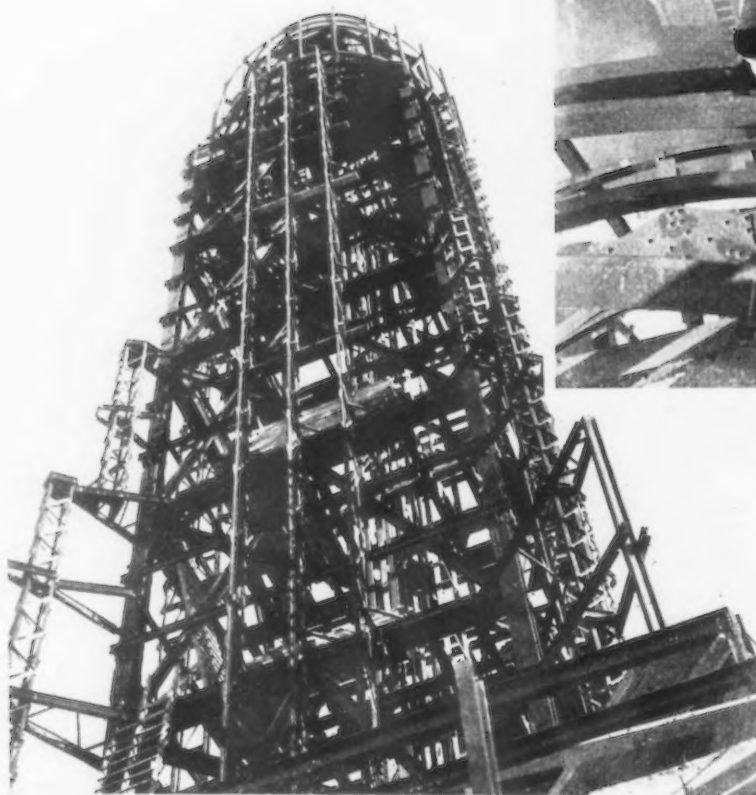
president of the Cadillac Motor Car Co., speaking for the National Automobile Chamber of Commerce; H. S. Fairbank, chief of the Division of Information, United States Bureau of Public Roads and member of the American Association of State Highway Officials; Ernest M. Smith, executive vice-president, American Automobile Association; Charles M. Upham, engineer-director, American Road Builders' Association, and Charles H. Davis, president, National Highway Association.

Mr. Fairbank said that 1931 would be the biggest road building year in history. For rural roads, alone, he said, nearly \$2,000,000,000 will be expended and employment will be given to about 2,000,000 men.

Tariff Commission Is to Investigate Lead Costs

WASHINGTON, March 2.—The Tariff Commission has begun an investigation regarding lead. It is based on a recent resolution of Senator King of Utah. The inquiry will be for the purpose of ascertaining the differences in the cost of production during 1928, 1929, and 1930 between articles in paragraphs 391 and 392 of the Hawley-Smoot act. These paragraphs cover lead ores and metallic lead in various forms, including certain manufactures. Except for ores imported for smelting in bond and exportation, these articles are dutiable. The commission will make no recommendation as to rates of duty.

DIRIGIBLE MOORING MAST
ON
EMPIRE STATE BUILDING



AT some time in the future, when transportation by dirigibles has become a regular service, passengers may be landed in the heart of New York. The large mooring mast atop the new 86-story Empire State Building, on the site of the old Waldorf-Astoria Hotel, in New York, has been built for this purpose. The picture was taken just after the structural steel erection for the mooring mast had been completed.

Another view from the top of the mast looking down makes 30 or 40 story buildings look like toys.

Porcelain Enamel Goods in Lighter Demand in 1930

WASHINGTON, Feb. 27.—Orders for porcelain enameled flat ware in 1930 totaled \$9,044,394, against \$11,660,318 in 1929, according to reports received by the Bureau of the Census from 26 establishments. Shipments last year were valued at \$9,628,193, compared with \$11,596,541 in the previous year.

Orders last December were valued at \$412,512, while those placed in November were valued at \$515,383. Shipments were valued at \$509,392 and \$524,486 respectively.

Manufacturers' Association for Middle West Formed

The Midwest Manufacturers' Association, Inc., has been issued incorporation papers by the Secretary of State of Illinois. The incorporators are Samuel M. Hastings, former president of the Illinois Manufacturers' Association; Colin C. H. Fyfe, general counsel, and James L. Donnelly, executive vice-president, of the Illinois Manufacturers' Association.

The new association will include the State manufacturers' associations of Michigan, Indiana, Missouri, Wisconsin, Nebraska, Iowa and Illinois. The particular object of the corporation is the maintenance of a cooperative organization of Middle Western manufacturers' associations; to promote the industrial development and general

welfare of the Middle West; to develop relations existing between the various State associations; to secure the enactment of beneficial and just legislation affecting the industrial welfare of the Middle West and to disseminate accurate and reliable information relative to the industrial and commercial progress and importance of the Middle West.

Galvanized Sheet Metal Products Less in 1930

WASHINGTON, March 2.—Production of galvanized pails and tubs in 1930 totaled 1,312,097 doz., against 1,624,811 doz. in 1929, while shipments amounted to 1,307,928 doz., valued at \$4,102,579, compared with 1,647,272 doz., valued at \$5,223,523, according to the Bureau of the Census. The output last December was 87,140 doz. and shipments were 68,898 doz., valued at \$194,873. November production was 60,798 doz., and shipments were 68,330 doz., valued at \$213,502.

Production of other galvanized sheet metal ware in 1930 amounted to 440,981 doz., compared with 541,212 doz. in the previous year, and shipments were 422,108 doz., valued at \$2,620,763, against 516,359 doz., valued at \$3,174,790.

The December, 1930, output was 21,657 doz., and shipments were 15,915 doz., valued at \$97,234. The November production was 16,061 doz., while shipments were 21,296 doz., valued at \$129,669.

Trade Associations Spend Millions for Promotion

WASHINGTON, March 2.—The expenditure of millions of dollars annually by trade associations in an organized effort to expand the markets for the products of their industries is disclosed in a preliminary survey made by the Trade Association Department of the Chamber of Commerce of the United States.

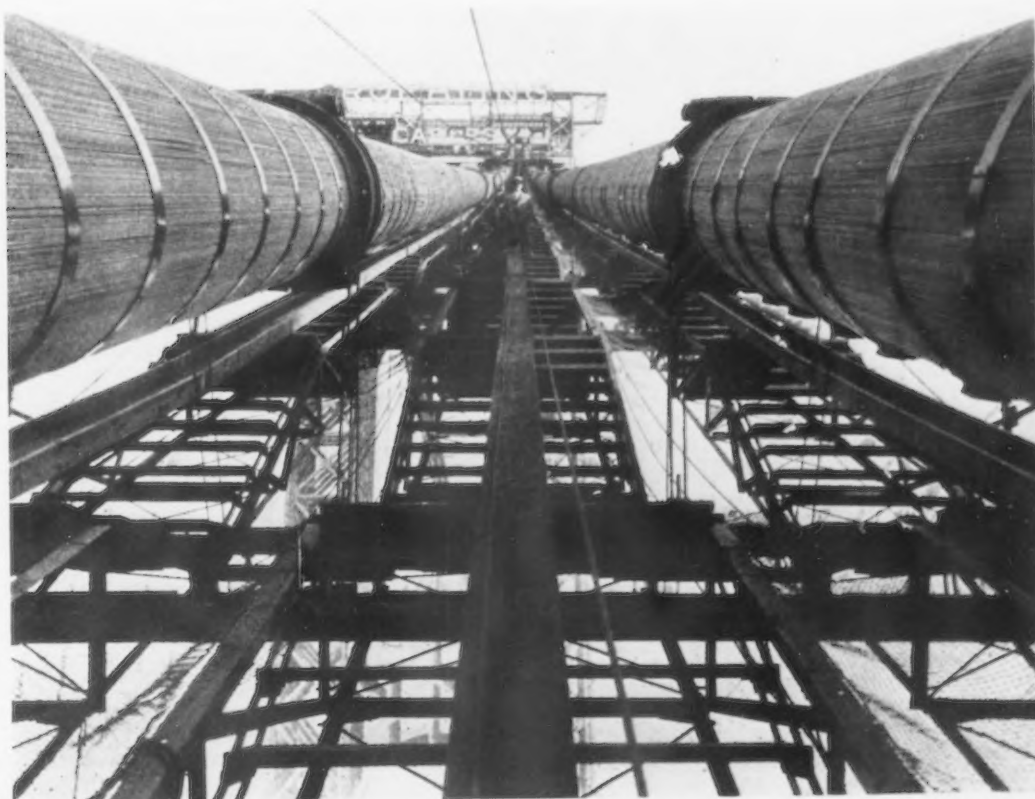
The chamber's department canvassed more than 1000 trade associations to determine the amount of money they expended for trade promotion purposes in 1930. Of this number, 400 associations reported that they had carried on trade promotion work last year at a cost of more than \$22,000,000.

The survey indicated the growing popularity of cooperative advertising as carried on by trade associations.

Allegheny Steel Co. reports net earnings for 1930 of \$1,610,292.81, compared with \$3,311,492.84 in 1929 and \$2,193,235.16 in 1928. After payment of \$233,982 in dividends on preferred stock, the earnings were equivalent to \$2.25 a share on the outstanding common stock. Sales billed during 1930 amounted to \$22,911,927, compared with \$28,863,516.49 in 1929. Current assets at the close of the year amounted to \$9,606,662.31, and current liabilities to \$1,693,415.98, showing a ratio of 5.7 to 1.

28,000 TONS OF WIRE CABLE

THE new Hudson River bridge, now nearing completion between Manhattan, N. Y., and Fort Lee, N. J., has required the use of about 28,000 tons of wire cable, manufactured by John A. Roebling's Sons Co., Trenton, N. J. In each of the two large cables shown in the illustration 26,000 strands of wire were used.



RATES OF DEPRECIATION SUGGESTED BY BUREAU OF INTERNAL REVENUE FOR IRON AND STEEL FOUNDRIES, ROLLING MILLS, COKING PLANTS, ETC.

	Probable Useful Life, Years			Probable Useful Life, Years			Probable Useful Life, Years	
	Life	Rate Per Cent		Life	Rate Per Cent		Life	Rate Per Cent
Steel blast furnaces	15	10	Crucibles and refractory	10	10	Air, steam and electric hoists (small)	15	10
Blowers	15	10	Refractories	10	10	Hoists of electric skip	20	10
Ingot ladles	15	10	Decapacitors, rollers and welding equipment	20	10	Rollers	20	10
Charging cars	15	10	Portable electric and pneumatic drills	20	10	Engine lathes	15	10
Charging cars hot metal	15	10	Rolls, 200, or 300 diam.	10	10	Roll lathes	20	10
Hearth	15	10	Rolls, 200, or 300 diam.	10	10	Mill machinery, except	20	10
Ingot molds	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Ladles	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
One casting machines	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Two casting machines	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Charging machines	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Steel converters	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Conveying and coal handling equipment	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Roll conveyors	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Electric traveling cranes	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Gantry cranes	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Hydraulic cranes	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Locomotive cranes	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10
Crucibles	15	10	Rolls, 200, or 300 diam.	10	10	Rolls, 200, or 300 diam.	20	10

Depreciation Rates Decided

Bureau of Internal Revenue Issues Preliminary Report of Its Studies

WASHINGTON, March 2.—The Bureau of Internal Revenue has issued a preliminary report giving results of its depreciation studies over a period of five years. At the same time it issued a revised bulletin ("F") on income tax depreciation and obsolescence, based on the revenue act of 1928.

In its foreword regarding the depreciation studies, the bureau explains that the use of rates of depreciation based on the probable useful life of various assets is not prescribed in any particular case, and employees of the bureau, as well as taxpayers, are cautioned against applying them arbitrarily. The bureau states that the rates are presented solely as a guide or starting point from which correct

rates may be determined in the light of the experience of the property under consideration and all other pertinent evidence. It is pointed out that it is expected that revisions will become necessary with changing experiences.

The pamphlet on depreciation studies lists in voluminous detail rates on all kinds of machinery and equipment, machine tools, etc., for the different industries. The bulletin on depreciation and obsolescence deals exhaustively with the basis for fixing allowances for depreciation and obsolescence in making tax returns.

A few of the many items carried in the report on depreciation studies are listed in the accompanying table at the top of the page.

& Son, Charleston, W. Va., was elected president of the Cincinnati chapter of the Institute of Scrap Iron and Steel, at its annual meeting Feb. 18. Other officers elected were M. D. Friedman, M. D. Friedman Co., Ashland, Ky., vice-president; Lee J. Workum, Schadel-Workum Co., Portsmouth, Ohio, secretary-treasurer. The executive committee, in addition to the officers, consists of William M. Hilb, Hilb & Bauer, Cincinnati; Ralph Kolkmeier, Walter Wallingford & Co., Cincinnati; Henry Israel, Israel Brothers Co., Dayton; Ben Shottenfels, David J. Joseph Co., Cincinnati.

William Rosenthal, Hyman-Michaels Co., St. Louis, was elected president of the St. Louis chapter of the Institute of Scrap Iron and Steel at the annual meeting Feb. 19. H. Cohen, Standard Steel & Rail Co., St. Louis, was elected chairman of the executive committee.

Coffin Awards Go to 38 General Electric Men

Employees' ideas, resulting in valuable contributions to the progress and efficiency of the General Electric Co., were recognized and rewarded Feb. 20 by the Charles A. Coffin Foundation, established by that company in 1922, and named for its first president. Awards of merit, consisting of a certificate and a monetary consideration, were made to 38 General Electric men, representing many classes of workers and scattered among the company's various factories and commercial offices.

Seven of the recipients are shop workmen; four are foremen; one is a construction foreman; six are tool designers and expert mechanics; eleven are engineers; six are commercial men, and three are administrative employees. The geographical division is: Schenectady, 17; Erie, Pa., and Cleveland, five each; Lynn, Mass.,

four; Pittsfield, Mass., and New York City, two each; Fort Wayne, Ind., Des Moines, Iowa, and Philadelphia, one each.

Scrap Institute Chapters Elect New Officers

E. G. Howell, Erman-Howell Co., has been elected president of the Chicago chapter of the Institute of Scrap Iron and Steel. Mr. Howell succeeds Frank Parker, who was not a candidate for re-election. Other officers chosen were: first vice-president, Benjamin Kaplan; second vice-president, I. Cohen, Milwaukee; third vice-president, D. R. Cohen, treasurer, Arthur Jeffery; chairman of executive committee, Walter Bregman; secretary, Henry M. Rosenthal. Frank Parker, the retiring president, and J. H. Turivas were elected to the executive committee.

Harry Silverstein, A. P. Silverstein

Enamelled Sheet Metal Ware Shipments Off in 1930

WASHINGTON, March 2.—Shipments of enamelled sheet metal ware in 1930 totaled 3,526,299 doz., valued at \$13,516,548, compared with 4,504,102 doz., valued at \$16,101,787, in 1929, according to reports received by the Bureau of the Census from 15 manufacturers, representing approximately 80 per cent of the industry. Shipments last December were 250,568 doz., valued at \$873,906 against 263,365 doz., valued at \$1,008,047 in November.

Movement of Pig Iron on New York Canal

The tonnage of pig iron and billet moved on the New York State Canal during the season of 1930 was as follows:

From	Net Tons
Albany	1,476
Buffalo	82,501
Cleveland, via Buffalo	26,982
Cleveland, via Oswego	280
Port Henry	7,528
Tonawanda	209
	112,954

Exports Lowest Since 1921, While Imports Gain Slightly

WASHINGTON, Feb. 27.—Like other producing countries, the United States experienced further reduction in iron and steel exports in January. The total amounted to only 92,745 gross tons. This was the lowest since August, 1921; compared with December, it reflected a decline of 9243 tons.

Of the January shipments, 41,910 tons, or 44.7 per cent, went to Canada. Chile was the next largest foreign market, taking 8641 tons. Japan, generally the second heaviest buyer of American steel, was third, taking 4824 tons; Mexico ranked next with 4398 tons.

The greatest drop in exports in January when compared with December was in black steel sheets, which declined to 7691 tons from 19,088 tons. The largest gain was in skelp,

which rose to 7957 tons from 3248 tons. Exports of steel bars increased to 3923 tons from 2932 tons while outgoing shipments of plain structural material increased to 10,926 tons from 9881 tons.

Imports in January were almost the same as those in December, making the small increase of 27 tons to 40,781 tons from 40,754 tons. The largest item in the iron and steel list was pig iron, whose imports amounted to 11,141 tons, of which 8336 tons came from India. Of the 2783 tons of ferromanganese imports, 1927 tons came from the United Kingdom and 756 tons from Canada.

Imports from Belgium were 10,609 tons, or 26 per cent of the total. Belgium supplied 1835 tons of the 2937 tons of concrete reinforcement bar

imports, 4123 tons of the 6779 tons of structural shapes and 1504 tons of merchant steel bars. Imports of merchant bars from Germany totaled 1884 tons, while imports of structural shapes from that country were 1433 tons.

An interesting feature of the incoming movement of iron ore is the growing volume from Soviet Russia, which in January amounted to 20,713 tons. Total iron ore imports were 149,686 tons, of which 111,714 tons came from Chile.

Manganese ore imports amounted to 17,447 tons, of which 173 tons were free of duty, coming from Cuba. Brazil supplied 7640 tons; India, 2871 tons; Soviet Russia, 2860 tons; Gold Coast of Africa, 2801 tons; and Chile, 822 tons.

Exports of Iron and Steel from the United States
(In Gross Tons)

	January, 1931	December, 1930	January, 1931
Pig iron	419	474	2,133
Ferromanganese	126	126	126
Scrap	9,394	10,580	62,433
Pig iron, ferroalloys and scrap	9,813	11,181	64,692
Ingots, blooms, billets, sheet bar	609	319	3,229
Skelp	7,957	3,248	4,754
Wire rods	5,248	9,912	3,481
Semi-finished steel	11,805	6,580	11,561
Steel bars	3,923	2,932	11,857
Alloy steel bars	433	433	11,041
Iron bars	44	128	231
Plates, iron and steel	2,166	4,296	10,661
Sheets, galvanized steel	4,936	4,799	10,449
Sheets, galvanized iron	717	234	795
Sheets, black steel	7,691	19,088	12,939
Sheets, black iron	713	714	5,217
Hoops, bands, strip steel	3,448	1,824	3,327
Tin plate,terne plate	6,780	8,912	22,322
Structural shapes, plain material	10,926	9,881	19,736
Structural material, fabricated	4,494	4,996	5,408
Tanks, steel	1,702	864	1,245
Steel rails	1,264	2,646	5,661
Rail fastenings, switches, frogs, etc.	593	1,085	1,609
Boiler tubes	769	765	1,478
Casting and oil-line pipe	4,128	4,169	5,762
Pipe, black and galvanized, welded steel	4,703	4,418	2,561
Pipe, black and galvanized, welded iron	721	428	9,760
Plain wire	1,608	1,659	2,886
Barbed wire and woven wire fencing	2,767	1,842	2,433
Wire cloth and screening	65	81	176
Wire rope	248	276	112
Wire nails	978	608	517
Other nails and tacks	412	495	628
Horseshoes	2	2	2
Bolts, nuts, rivets and washers, except track	508	657	1,152
Rollled and finished steel	64,686	57,397	139,266
Cast iron pipe and fittings	2,518	2,658	2,792
Malleable iron screwed fittings	682	290	1,397
Car wheels and axles	978	1,227	783
Iron castings	397	589	651
Steel castings	433	314	696
Foundings	729	585	719
Castings and foundings	2,794	2,677	6,966
All other	646	886	1,314
Total	92,745	101,988	225,766

Imports of Iron and Steel Products into the United States
(In Gross Tons)

	January, 1931	December, 1930	January, 1931
Pig iron	11,141	13,881	9,080
Scrap	101	111	490
Ferromanganese and ferroalloys*	2,783	1,111	45
Ferrosilicon	279	274	165
Ferrosilicon	132	132	132
Other ferroalloys	1,314	1,373	1,961
Scrap	1,314	1,373	1,961
Pig iron, ferroalloys and scrap	16,144	16,188	19,439
Steel ingots, blooms, billets, etc.	2,255	1,926	1,795
Wire rods	281	684	941
Semi-finished steel	3,347	3,619	5,729
Concrete reinforcement bars	2,947	2,869	2,799
Yellow bar and drill rods	78	48	799
Merchant steel bars	1,284	8,818	118
Iron bars	109	263	651
Iron plates	56	56	651
Boiler and other plates	1,167	2,652	2,652
Sheets, skelp and saw plate	21	6	9
Tin plate	21	6	9
Structural shapes	6,779	3,941	3,949
Sheet piling	299	198	598
Rails and rail fastenings	279	375	591
Welded pipe	1,584	1,592	2,678
Other pipe	629	377	377
Barbed wire	474	145	441
Round iron and steel wire	6	2	2
Telegraph and telephone wire	44	41	269
Flat wire and strip steel	156	186	291
Wire rope and strand	69	36	56
Other wire	1,139	1,771	768
Hoops and bands	584	479	595
Nails, tacks and staples	141	37	78
Bolts, nuts and rivets	20,843	19,689	20,861
Rollled and finished steel	20,843	19,689	20,861
Cast iron pipe and fittings	729	1,885	922
Castings and foundings	125	87	141
Total	40,781	40,754	43,624
Manganese ore*	17,447	28,713	28,622
Iron ore	149,686	175,929	292,800
Magnetite (dead bar) only	1,829	3,259	9,267

*Manganese content only.
Chromium content only.
Silicon content only.

Conduit Pipe Automatically Galvanized and Enameled

(Continued from page 791)

them through the complete cleaning, plating, enameling and baking processes without further handling.

The specially designed conveyor system is made up of materials suitable for the work, being acid and corrosion-proof at those points where acids and strong alkaline solutions are used. It has sprockets or spider pick-ups, which lift the pipe from each tank and immerse it in the following tank, as well as pushers that aid in conveying the pipe. These parts are made of steel, special non-plating composition material and acid-resisting metals, depending upon what solutions they must withstand. The tanks throughout are made of steel and are rubber lined where the nature of the solution necessitates an added protection, as in the pickle, acid dip, galvanizing and rinse tanks.

Machine Performs 17 Operations

The various solution temperatures are regulated by thermostatic control. Motion or agitation throughout the various pickling, cleaning and rinsing solutions is provided, which not only accelerates their action, but permits reduction in acid and alkali solution concentration. The zinc sulphate solution in which the pipe receives its final heavy coating of zinc has a capacity of 9600 gal. In addition, there is an auxiliary tank of the same solution composition, of a capacity of 5000 gal., which is piped to the main galvanizing tank and is provided with a filter and motor-driven pump for circulation in order to maintain maximum galvanizing solution efficiency with minimum attention. The main bath is changed and filtered automatically every 2 hr. without interruption in production or equipment adjustments of any kind.

The machine has 17 operations, as follows:

1. Automatic coil end discharge
2. Rinse and spray
3. Alkaline electrolytic cleaning
4. Rinse and spray
5. Acid pickle
6. Acid dip
7. and 8. Double zinc and spray
9. Zinc cyanide "strike" solution
- 10 and 11. Double rinse and spray
12. Zinc sulphate "finish" solution
- 13 and 14. Double rinse and spray
15. Air blast through pipe and dry
16. Enameling
17. Baking and discharge

The installation includes generators capable of producing 30,000 amp. This is provided by motor-generator sets, which are all housed in a glass inclosure at one side of the room in which the machine is located. The glass inclosure prevents injury to the electrical apparatus from acid fumes, dust or dampness. The entire installation is driven by only one 5-hp. motor.

The component operations of cleaning, pickling, rinsing, galvanizing, enameling and baking combined in the

machine, are completely continuous, so that each length of pipe is in motion throughout the processing treatment. The different treatment cycles have been predetermined and synchronized as a whole. The pipe is supported along the bottom of the tanks on a series of rails or tracks, being made of copper in the plating baths so as to simultaneously supply the negative current to the work. These rails or tracks converge from both sides of the tank. Convergence of these tracks provides a constantly changing point of electrical contact so that each length of pipe is uniformly exposed to the electrolytic action. The anodes or electrodes are disposed underneath the pipe, being simply laid on suitable supporting positive copper current conductors. These anode conductors are lead-sleeved.

The rough pipe is placed, in bulk, horizontally on a rack at the head of the machine and is held in a substantially horizontal position throughout its treatment. The spider wheels and conveyors, over the series of tanks, pick off the individual length of pipe and convey them from tank to tank, through the dryer, to the enameling section and finally through the enamel baking oven, from which they are automatically discharged. At the outset the pipe first enters and is conveyed through an alkali soaking bath. Upon reaching the opposite end the pipe is lifted from this tank, drained and carried into a rinse, thence into an alkaline electrolytic solution. After another rinse, the pipe is submerged in an acid pickling solution. Then comes the acid dip, followed by a double rinse, which removes the acid used to clean the pipe. Entering the zinc cyanide "strike" solution, the pipe gets its first coating of zinc. It is then double-rinsed again, and immersed in the zinc sulphate "finishing" solution, where it receives a heavy coating of zinc. Another double rinse is employed, then an air blast automatically blows through the pipe to facilitate drying, after which it is sent through the drying section of the machine. It is now ready for enameling on the inside, which the enameling section proceeds to do.

Enameling by a Unique Method

As the lengths of pipe emerge from the dryer they travel down a slight incline, accumulating in groups of five, the first one when leaving the dryer contacting with a starting lever of the enamel unit, which automatically starts it operating. The pipe is enamelled on the inside by an ingenious arrangement of spray nozzles in combination with a rotating pipe-holding rack or carrier, capable of supporting and treating five lengths of pipe simultaneously. The rotation of the pipe carrier having been started, it picks up five lengths, whereupon rotation ceases and the carrier moves sidewise, telescoping the pipes over the enamel spray nozzles. With the nozzles inserted to the full length of the pipe, the carrier automatically re-

verses its direction of travel, and, as the nozzles are withdrawn, the interior of the pipes is sprayed with an enamel lining.

Various safety features have been incorporated, such as limiting the enamel spraying action to the number of pipes actually in the carrier. Should there be, for instance, only four instead of the usual five lengths of pipe in the carrier, the particular nozzle for this absent pipe will be shut off automatically and the balance of the nozzles will function as usual. Again, should by any chance a length fail to be properly aligned for entry of the spray nozzle, due to being badly bent, or for other reasons, an automatic switch stops operation of the enameling unit without interrupting operation of the balance of the machine. The spray nozzles have been designed to avoid clogging due to drying of enamel, but, should this occur, as, for instance, when operation has been suspended over the week-end, the nozzles may be simultaneously and quickly cleaned by shutting off the enamel and shifting a lever which reverses the feed from the enamel tanks to the gasoline supply, forcing a gasoline spray through the nozzles.

Baking Arrangement

Enamel spraying completed, the galvanized and enamel-lined pipes are automatically discharged from the enameling unit and conveyed into the baking oven. It is of special design and provided with suction fans, which constantly circulate hot air around and through each length of pipe during its travel through the oven. The conveyor system in this oven consists of three sets of conveyors moving in horizontal planes, the pipe automatically traveling from one plane to another until it leaves the oven at the discharge point. During a portion of the travel of the pipe through the oven it is rolled in order to maintain absolutely uniform distribution of the enamel coating while setting, after which it is conveyed without rolling to prevent possible marring of the galvanized surface.

Although the baking operation is of much longer duration than most of the other operations on the machine, because of synchronization of the entire process, the pipes are sent into the oven steadily, and they emerge in like manner at the rate of 10 lengths a minute, ready for inspection, labeling and shipment.

The builder of the machine, in collaboration with Steel & Tubes, Inc., has produced a 16 mm. motion picture film showing its operations.

The United States Galvanizing & Plating Equipment Corp. states that similar automatic machinery can be adapted to other types of work and to other types of finish. Practically all kinds of electroplate can be applied with such a system, and spraying may be eliminated entirely or it may be adapted to the use of paints, lacquers or other coating materials as well as enamel such as used in the pipe.

Perpetual Inventory Control Tied in With Production Control

(Continued from page 772)

by special parts, should the customer's order require such a substitution. Thus the standard assembly of Fig 3 is by no means ironclad. But its use in toto, instead of having all its items recopied every time on the assembly order, saves a great deal of time and perhaps some possibility of error.

Standard sizes of orders are in vogue for replenishment of most of the parts carried in inventory. These amounts have been worked out, empirically, as those which it is most advantageous to purchase, or to make, at one time. Thus, on Fig. 8, the "Standard Ordering Quantity" of springs, piece No. 72915, is stated (upper left) as 10,000.

But this is by no means inflexible. Items which

the card show to be in infrequent use may merit a reduction in the stipulated ordering quantity. Perhaps the piece, or the unit assembly of which it is a part, is being subjected to obsolescence. If so, consultation with the engineering department will help in determining how much to order, to take care of probable nearby requirements. This same consideration enters into orders during periods of depression.

Storerooms are specialized as to what they contain and what departments they serve. For the most part, all stores and parts for making motors are kept in close proximity to the several departments engaged in that work. Similarly, materials needed by the signal department are held close to where the signaling installations are made and assembled. This avoids confusion—it obviates necessity for long hauls of parts—it concentrates each operation within its own circumscribed range, and tends to lower cost.

Good Gain Reported in Machinery Exports in January

WASHINGTON, Feb. 27.—Gains in exports of machinery which began last November were continued in January, when they were valued at \$37,743,000, an increase of \$1,512,000 over December. Industrial machinery exports also continued their expansion and in January were valued at \$15,089,000, reflecting the sharp rise of \$1,996,000 over December.

Exports of machinery and vehicles in January rose to a value of \$54,103,000, an increase of \$635,000 over December exports.

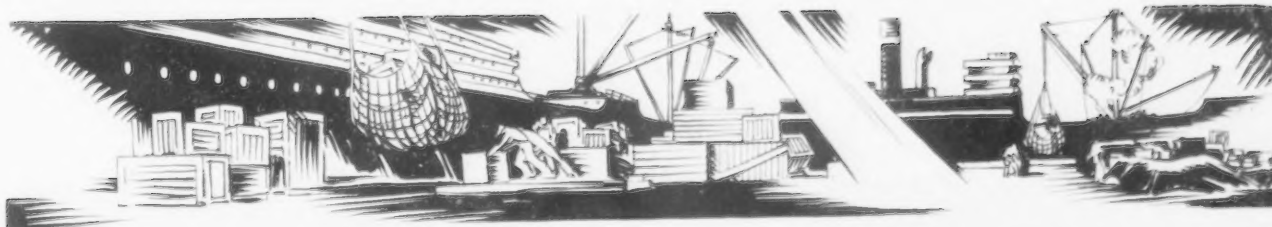
Imports of machinery in January were practically the same as in December, increasing by only \$4,230 to a value of \$1,249,320. Imports of machinery and vehicles in January were valued at \$1,554,515, while incoming shipments of industrial, office and printing machinery were valued at \$787,019.

Imports of Machinery into the United States (By Value)

	January, 1931	December, 1930	January, 1931
Metal-working machine tools	\$14,350	\$22,367	\$164,203
Agricultural machinery and implements	490,112	161,860	711,510
Electrical machinery and apparatus	170,338	320,757	154,449
Other power-generating machinery	14,945	21,929	85,044
Other machinery	452,485	592,361	956,913
Vehicles, except agricultural	107,039	125,816	183,369
Total	\$1,249,320	\$1,245,090	\$2,254,890

Machinery Exports from the United States (By Value, in Thousands of Dollars)

	January, 1931	December, 1930	January, 1931
Locomotives	\$23	\$51	\$20
Other steam engines	61	89	55
Boilers	21	17	221
Accessories and parts	49	99	91
Automobile engines	117	109	294
Other internal combustion engines	293	425	766
Accessories and parts	180	174	420
Electric locomotives	51	597	91
Other electric machinery and apparatus	556	648	987
Excavating machinery	456	403	1,032
Concrete mixers	18	31	93
Road-making machinery	56	147	292
Elevators and elevator machinery	313	233	654
Mining and quarrying machinery	1,406	1,117	1,842
Oil-well machinery	2,281	1,163	2,674
Pumps	350	494	1,017
Bending and power presses	415	486	285
Forging machinery	252	45	284
Machine tools	1,820	2,129	1,889
Rolling machines	381	113	91
Other metal-working machinery and parts	307	347	671
Textile machinery	558	336	1,039
Sewing machines	392	371	729
Shoe machinery	113	116	158
Flour-mill and gristmill machinery	16	49	21
Sugar-mill machinery	80	192	252
Paper and pulp-mill machinery	151	187	226
Sawmill machinery	29	89	108
Other woodworking machinery	111	105	241
Refrigerating and ice-making machinery	136	291	215
Air compressors	239	282	664
Typewriters	988	1,042	2,206
Power laundry machinery	80	174	125
Typesetting machines	268	340	356
Printing presses	163	175	519
Agricultural machinery and implements	12,298	8,929	18,697
All other machinery and parts	12,517	14,433	21,682
Total	\$37,743	\$36,231	\$56,112



Recent Developments in Non-Ferrous Metal Rolling Mills

NON-FERROUS metal rolling mills represent but a small section of the rolling mill industries at large since the extrusion process takes care of a very important branch of non-ferrous manufacture, the production of shapes. Hot rolling is carried out in the manufacture of plates, sheets and wire, while cold rolling is employed in the case of strips and sheets.

The development of the hot rolling processes for non-ferrous metals has, in general, followed that of the iron rolling industry, said L. Weiss in a paper before the German Institute of Metals at its annual meeting, Nov. 8 to 11, 1930. A very important development in the hot rolling of sheets has been induced by the recognition of the fact that, within a limited range of temperatures, pressure brass may be rolled hot. The author outlines the development of the rolling mills, and describes the advantages of the four-roll system originally developed in the United States about ten years ago.

State, City and Metal Trades Unite in Training Workers

(Continued from page 763)

Consisting of a machine shop, pattern shop, tool room and stock room, the school gives the students working conditions identical with those they will find in the average industrial plant.

Mechanical drawing is given in a practical rather than a technical manner. During the first year it comprises the making of sketches and drawings from castings and machine parts; the second-year course includes the solving of formulas and the use of various tables and necessary calculations. Construction of materials which the draftsman encounters in his work is the topic for the third year, while the fourth and final year of the drawing course is made up of lessons relative to the designing of various machines and the important parts leading to the successful performance and operation for which they are intended. In the machine shop practice course the student has the opportunity to learn how to operate millers, planers, shapers, drill presses, broaching machines, punch presses, boring mills and grinders.

Through the efforts of the educational committee of the Cincinnati branch, National Metal Trades Association, each company in the Cincinnati metal trades last year appointed one of its employees as educational adviser to help the men in the office and plant to select "study-work" best adapted to their needs. The educational adviser not only is a friendly consultant for those who wish to add to their educational equipment by taking night courses, but also is a point of contact for the educational committee in its desire to reach every man in a plant. The adviser might be termed the "liaison officer" between the committee and the metal-trades workers throughout the city. The system of having educational advisers has not been set up to function for a temporary purpose, but rather to be a permanent

organization and its success to date promises well for its future.

One of the projects encouraged by the educational committee was publication of a booklet describing the courses offered by the Young Men's Christian Association, University of Cincinnati and Ohio Mechanics Institute. It was the joint effort of these three institutions and is claimed to be the first cooperative venture of its kind in Cincinnati. In a message addressed "to the adults in metal-working industries" the booklet states that "the employers in our metal trades also realize the need of better schooled men and women in industry and have co-operated in the planning and distribution of this booklet in order that it may accomplish its purpose among their employees. The back page of the booklet is perforated so that an employee may indicate in what subjects he is interested and mail the card to the educational committee. Under the heading "Courses of Special Interest" are listed alphabetically numerous courses offered by the three schools.

The committee on mechanical trades school, responsible for the organization, equipment and operation of the school as a part of the vocational education department of the Cincinnati public schools, consists of Fred A. Geier, Cincinnati Milling Machine Co., chairman; J. Wallace Carrel, Lodge & Shipley Machine Tool Co.; J. B. Doan, American Tool Works Co.; David C. Jones, Lunkenheimer Co.; E. R. Knight, Allis-Chalmers Mfg. Co.; R. K. LeBlond, R. K. LeBlond Machine Tool Co.; August Marx, G. A. Gray Co.; A. H. Tuechter, Cincinnati Bickford Tool Co.; and C. E. Wolfe, Dalton Adding Machine Division of Remington-Rand, Inc. The committee on industrial education, which has assisted in establishing individual courses and in developing the actual educational program, is comprised of G. A. Seyler, Lunkenheimer Co., chairman; R. L. Rickwood; Max B. Robinson; L. A. Yoder; R. L. Nelson, Allis-Chalmers Mfg. Co.; R. E. Blair, American Tool Works Co.; and William L. Dolle.

Electric Refrigeration a Rapidly Growing Industry

(Continued from page 761)

the National Electric Light Association has already inaugurated a campaign for the sale of 1,000,000 domestic refrigerators this year. The plan is to be supported by all companies making and selling refrigerators, which in turn will cooperate with utility companies interested in the power load after the unit is installed.

Mechanical refrigeration, of course, is not confined to electrically-operated units, but also includes those using gas. However, total sales of gas refrigerators are estimated at about 250,000 units as contrasted with over 3,000,000 electric units. One of the reasons why electric refrigeration has far outstripped its rival is that the electric industry has been far more aggressive in its merchandising program than the gas industry, which until recently apparently did not realize the opportunity it had been passing by. Some companies in the electric refrig-

eration business, however, see the possibilities in gas-refrigeration, and in at least one case have organized a separate corporation to manufacture gas-operated units. It is reasonable to predict, therefore, that sales of gas refrigerators will show substantial gains in the next few years.

Without drawing undue attention, the electric-refrigeration industry has been consuming more steel each year. Although no official figures are available, it is estimated that consumption in 1930 amounted to 150,000 tons. This is based on the fact that 1,000,000 units were built, each with an average weight of 400 lb. It is thought that about 75 per cent of the total weight is steel and iron.

Use of steel is not going to stop at this figure, however, for not only is the trend of sales upward and likely to continue in that direction indefinitely, but also the all-steel unit is gaining in favor. One large maker has built nothing but all-steel refrigerators since it first entered the industry. Others, however, put considerable wood into the framework of the cabinet, but this practice is rapidly disappearing. It is thought by some production executives that in the near future all companies will discard wood in favor of steel.

The reasons for favoring steel are not hard to discover. Steel lends itself more easily than wood to manufacture on conveyor assembly lines. Steel

cabinets likewise are more durable, not being affected by wide temperature ranges, whereas wood soon goes to pieces at low temperatures. They also are more easily fabricated, resulting in lower production costs. The manufacture of full-finished sheets gives the electric refrigerator maker an opportunity to apply highly effective finishes to the cabinet at a comparatively small expense.

Consumption of metals by the industry, however, does not end with iron and steel. It can best be illustrated by the statement of an official of one prominent company who revealed the following purchases by his company in 1929: 6900 tons of steel, 3420 tons of iron, 2750 tons of iron castings, 6,000,000 nuts and bolts, 1,800,000 lb. of copper tubing, 3,000,000 lb. of copper for tanks, 240,000 lb. of solder, 1,200,000 lb. of wire for cabinet shelves, 600,000 ft. of insulated wire for cabinets and 36,000 lb. of tin. It bought 25,000 to 30,000 lb. of bakelite each month. Incidentally, this concern's production last year showed a gain of about 25 per cent with a corresponding increase in the use of metals.

Monel metal has been extensively employed for some small parts in household units and for the exterior of many commercial units, especially ice cream cabinets. One maker, however, has recently changed to rustless steel for bolts, screws, corner pieces and cabinet fixture pieces. It is believed that rustless

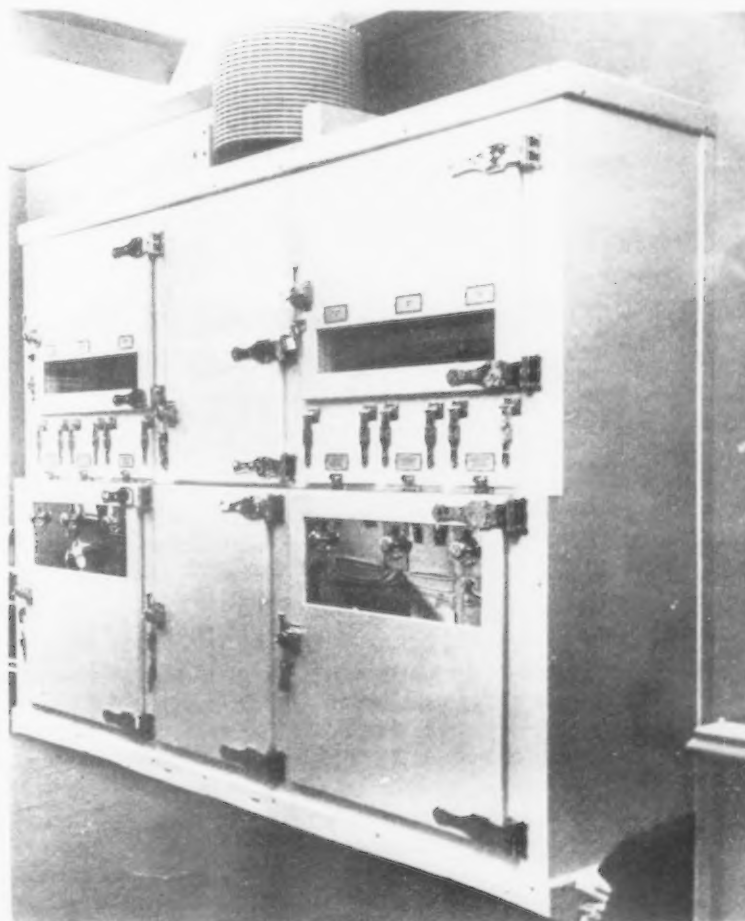
VENDING REFRIGERATOR OFFERS NEW USE FOR STEEL

THE specially designed and constructed electric refrigerator, shown in the accompanying illustration, was built by the General Electric Co., Schenectady, N. Y., and is one of several vending units for an automatic grocery store, developed by N. Robert Harvey, New York, with technical assistance from Perin & Marshall, consulting engineers, New York.

Perishable food products, such as packaged meats, eggs and butter, are vended by the refrigerator, which contains an endless-chain mechanism, to which 20 or more separate trays may be attached. One or more coins of various denominations release the starter on a $\frac{1}{4}$ -hp. General Electric motor and the chain carries a tray to a door, which is automatically released so that the contents of the tray may be removed.

A non-refrigerated unit, which vends canned, bottled and baked goods, operates on the same principle, each compartment having a capacity ranging from 20 to as many as 28 trays, depending upon the height of the product carried.

Weight of an article is of minor importance, as each endless chain has a total lifting capacity of 300 lb. and can carry a stock of 20-lb. articles, which would limit the number of trays. While the present experimental units, now being commercially operated in a New York apartment hotel, are of wood with the chains, trays and other mechanical parts of the vending equipment of chromium-plated steel, estimates are being obtained on the cost of quantity production of the units in all-steel construction, using enameled or other specially coated sheets for the cabinet work.



Business as Others See It

Digest of Current Financial and
Economic Opinion

APPREHENSION occasioned by the passage of the bonus bill has been offset by relief over the avoidance of a special session of Congress.

"Without politics to distract us," says Theodore H. Price, *Commerce and Finance*, "America ought to be able to achieve a remarkable comeback during the next six months."

While commentators in general still regard such recovery as more remote, there is unquestionably a more sanguine feeling among them, even in estimating the consequences of the bonus legislation. It is now believed that the financing of bonus loans, although imposing a heavy burden on the United States Treasury, will be accomplished without an exaggerated effect on the bond market, although it is conceded that much will depend on the extent to which veterans apply for loans and the amount of revenue derived from income tax returns. Certain it is that the Administration, which stoutly opposed the bonus measure, will do all that it can to reduce its untoward effects. In referring to financing that the Treasury Department must now undertake, *Financial Chronicle* remarks that "Mr. Mellon will be found equal to the occasion."

Meanwhile public interest is centering in the possible impetus that the bonus loans may give to con-

sumer buying. It is recognized that it is economically unsound to tax one group of citizens to subsidize another, but the view is nevertheless held in some quarters that the wide distribution of "new money" at this time may supply enough leverage to pull us out of the present impasse.

Quite apart from this artificial factor, some observers see signs of business convalescence. Silberling notes that merchandising is being stimulated by the necessity for replacing depleted inventories. Poor's weekly letter reports a "widespread revival of new buying," which is not yet adequately reflected in terms of volume because of the small size of individual orders. Purchases of small quantities, however, are "characteristic of the first upturn from a period of depression" and usually mean that "consumers and dealers have been forced into the market by the exhaustion of their supplies."

Better Cotton and Lumber Orders

Passing from the general to the particular, a gain in cotton consumption is pointed to as significant by the Alexander Hamilton Institute. Cotton mills consumed 454,000 bales of raw cotton in January, as compared with 406,000 bales in December, and weekly average sales of cotton cloth in January were 59,777,000 yards, against

36,531,000 yards in the previous month, an increase of 63.6 per cent. Revival in the cotton industry in 1921 marked the beginning of general recovery from the post-war depression, the institute recalls.

Lumber orders also are a favorable indication, having exceeded production by a substantial margin for the eighth consecutive week, according to telegraphic reports to the National Lumber Manufacturers Association. New business at 815 hardwood and softwood mills for the week ended Feb. 21 was 22 per cent greater than the cut.

Prices and Business Recovery

These and other increases in commodity turnover are discounted by Benjamin Baker, *Analyst*, who calls attention to the international surfeit of raw materials, adding the comment that the world as a whole has reached the point where it is producing an unexchangeable excess of many products. No substantial gain in general business can be expected, in his opinion, while the commodity price level is still decisively falling. Recent activity of the stock market, in his view, lacks economic foundation.

A different interpretation is made by the Harvard Economic Society, which finds in the rise of security prices an augury of an upturn first of business volume and later of commodity prices.

steel will make further inroads on other metals in the next few years.

Industry a Large Outlet for Machine Tools

In the industry's significance to the metal-working trades, one should not forget its use of machine tools. Three of the biggest machine tool orders in recent years have been placed by electric refrigerator companies. In two of the transactions, purchases ran well over a million dollars and in the third case exceeded half a million. Moreover, while the industry closely resembles the automobile industry in its production methods, it claims the distinction of holding its work to much higher precision standards, its tolerances in many instances approaching those of fine watch makers.

What is the life of an electric refrigerator? No one seems to know. One company, making units since 1914, is advertising that none of its refrigerators has ever worn out. Another company is of the opinion that 10 to 15 years is the average life; at least by that time a model will be so obsolete that the owner will voluntarily want to replace it. As a matter of fact, the industry is so young that it really doesn't know yet how good a product it is making. Improvements and refinements in appearance are

constantly being added; with all companies engaging intensively in research and experimental activities, it may be that radical changes in the method of refrigeration will occur. Experiments already performed give promise of eliminating obnoxious and dangerous gases in the refrigerating process.

Whatever these changes may be, the industry is almost certain to become of increasing importance as an iron and steel customer as well as a market for many other branches of the metal-working trades. The phrase so aptly applied to road building might well fit electric refrigeration—"this industry knows no depression." It has disregarded the consternation which has been going on among its neighbors as they felt the full force of the business storm. Unhindered by tradition and possessed of a product with vast sales possibilities, the mechanical refrigerator manufacturers are slowly but surely transforming a luxury into a necessity. With a unity in their ranks heretofore unknown, it is not unreasonable to expect that the industry will enjoy a growth comparable with that of the automobile industry. Under the circumstances, iron and steel makers may well watch closely its development and lend every possible assistance in nurturing what already has proved to be a substantial outlet for their goods.

THE IRON AGE

March 12, 1931



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IRON AGE PUBLISHING CO.
239 West 39th Street,
New York, N. Y.
Cable Address: "Ironage, N. Y."

F. J. FRANK, *President*
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Division of
UNITED BUSINESS PUBLISHERS, INC.
New York, N. Y.

District Offices:
CHICAGO, Otis Building
PITTSBURGH, 1319 Park Building
CLEVELAND, 1362 Hanna Building
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Copyright, 1931, by
IRON AGE PUBLISHING CO.
Member, Audit Bureau of Circulations
Member, Associated Business Papers
Published every Thursday. Sub-
scription Price: United States and
Possessions, Mexico, Cuba, \$6.00;
Canada, \$8.50; foreign, \$12.00 a
year. Single Copy 25 Cents.

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WHAT IS "NEWS"?

NEWS is defined in the dictionary as "fresh information concerning something that has recently taken place."

To the editors of a daily newspaper, news is anything of importance that happens, from a murder to a horse race, that is of interest to a considerable number of its readers.

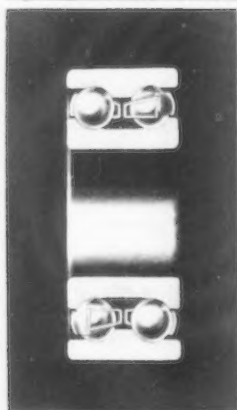
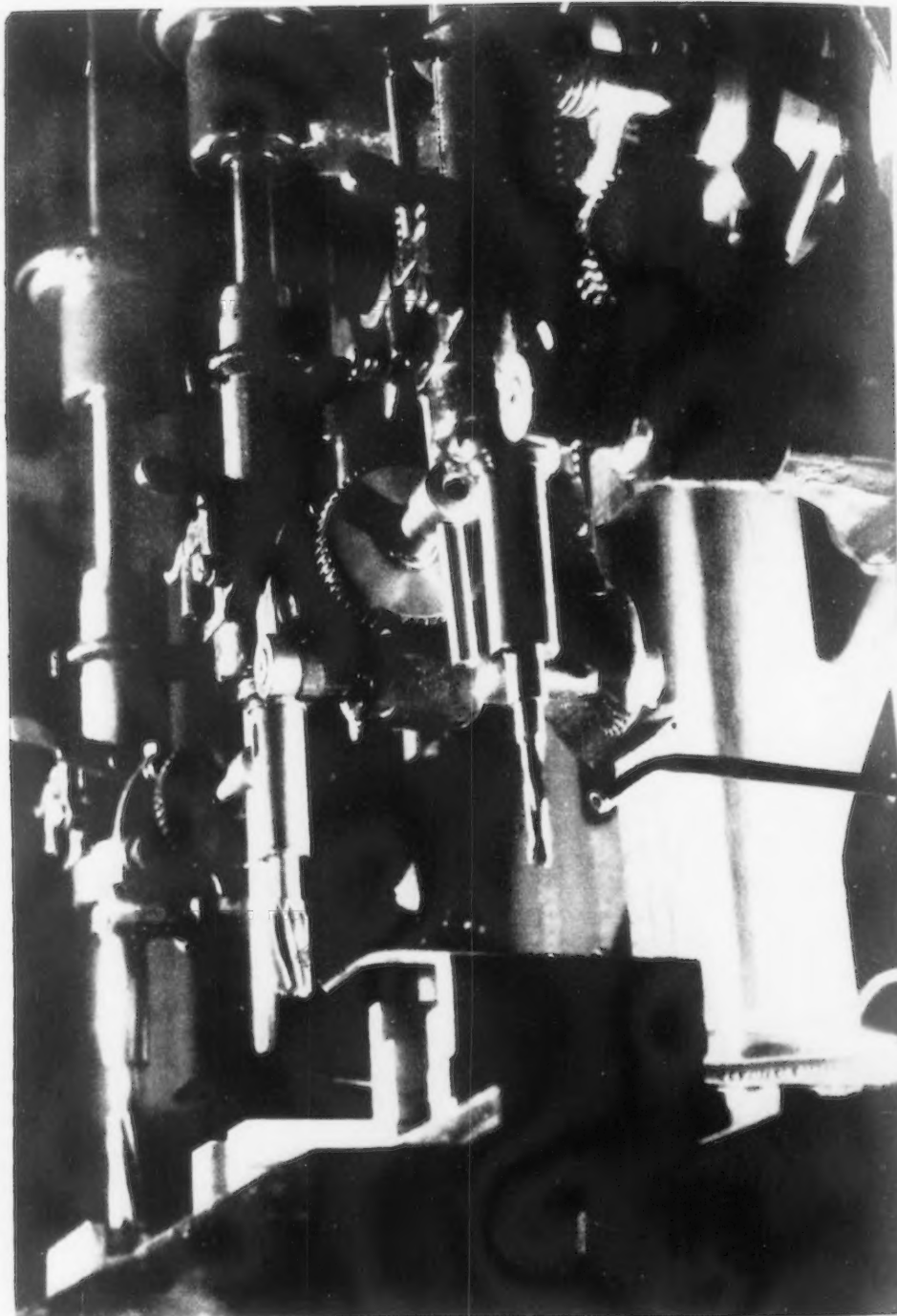
Editors of a business paper have a somewhat different conception of news. Every item of news that appears in The Iron Age is carefully selected not solely because of its interest to many readers but because of its VALUE to them.

Nation-wide coverage of all of the important happenings in industry enables The Iron Age to lay on your desk each week the news that is most vital to your business.

All this comes in addition to the significant developments in production methods, metallurgy, plant management, prices and market conditions, which are published with an eye to their news values as well as other values. No wonder, then, that the alert reader of The Iron Age is anxious that none of this exceptional service shall be missed. For example, Robert C. Hopkins of the Alliance Brass & Bronze Co., Alliance, Ohio, writes:

"Your paper is live, up-to-date and very energetic, and we are afraid that something might be missed if an issue of a year's subscription were eliminated, and, so to set everything at rest, we are inclosing check to cover subscription."





As bearings function . . . so do the spindles

Assembled at the factory under slight compression, the New Departure double row bearing is rigidly adjusted for all time, with no looseness, axially or otherwise. Its thrust capacity from either direction is even higher than its radial rating. It is compact, accurate, free-rolling. Thousands of drill spindles are rotating in the steady support of this husky unit. Have you studied its profit-possibilities in your machines? The New Departure Manufacturing Company, Bristol, Connecticut.

NEW DEPARTURE BALL BEARINGS

THIS ISSUE IN BRIEF

MARCH 12, 1931

NEXT WEEK

WHAT should manufacturers do during periods of sub-normal activity to prepare for the next upward swing in business? How many manufacturers have carried out expansion programs in times of prosperity only to find when the facilities are ready that business has entered upon a low phase of activity? How can such mistakes be overcome?

The answer, in part at least, is given in an article by a well-known industrial engineer in the next issue.

In periods of prosperity most manufacturers can obtain a sufficient margin of profit to cover up wasteful methods, but this is not possible when depression has brought its inevitable price deflation.

Well-managed enterprises prepare in slack times for the upturn that is sure to follow.

All business will profit by the formulation of sound planning policies with respect to the swings in the business cycle.

Banish the Machine Age Bogey

If fallacious statements now broadcast regarding the dangers of the machine age gain wide acceptance, the march toward abolition of poverty will be delayed.—Page 845

Machine—Friend or Enemy?

Causes for the present maladjustment may lie outside of mechanization. Perhaps frenzied finance, graft, racketeering and congressional ineptitude may have eaten up real wealth gains of the machine.—Page 847

Cuts Handling Costs 40 Per Cent

Stamping plants receive sheets from cars on a roller conveyor turntable, which enables one operator to load receiving tables for oven. Stock to be stored is picked up by means of a motor-driven sheet-metal grab, on an overhead tramrail.—Page 850

Cartels No Cure for Price-Cutting

Recommendation is made that German machine tool builders standardize parts, budget costs, and compare production and distribution practices, to attain greater economy.—Page 851

Settling Out of Court Saves Money

Instead of going to court, disputants may submit their differences for arbitration by men who are in the same line of business. Expensive litigation is saved. A final decision is made promptly.—Page 852

High-Strength Heat Treatment for Aluminum Sheets

Use three heating-solution bath tanks which contain a solution of potassium and sodium nitrate, heat to approximately 950 deg. F., and immerse parts briefly.—Page 858

Gear Lubricant Must Resist Film Rupture

Lubricating film is dependent upon the adhering properties of the lubricant to the tooth surface. It must have sufficient viscosity to resist rupture under intense pressure.—Page 861

Last to Lose Their Jobs

Investigation reveals that the major factor in retaining employees when forces are being cut is "superior qualifications." Next is length of service, and third, regularity of attendance.—Page 854

Taking Orders for Aircraft Sheet-Metal Parts

Shop must work to close limits, for airplane must be perfectly balanced. Job and repair work ordinarily does not pay, though it often leads to other, profitable work.—Page 855

Does Raw Lime Purify Steel?

Chemical analysis does not bear out the opinion held by some furnace men that the violent boiling caused by raw lime charge oxidizes impurities. Burnt lime produces a better slag.—Page 864

Are "Flat" Heats Caused by Low Manganese?

High-silicon content of the bath is the chief cause, metallurgist believes. Silicon will deoxidize the bath to such an extent that there will be no boil.—Page 865

Ware of Misleading Creep Tests

Unless tests are made with the utmost precision of measurement and temperature control, a stability that does not exist may be indicated.—Page 869

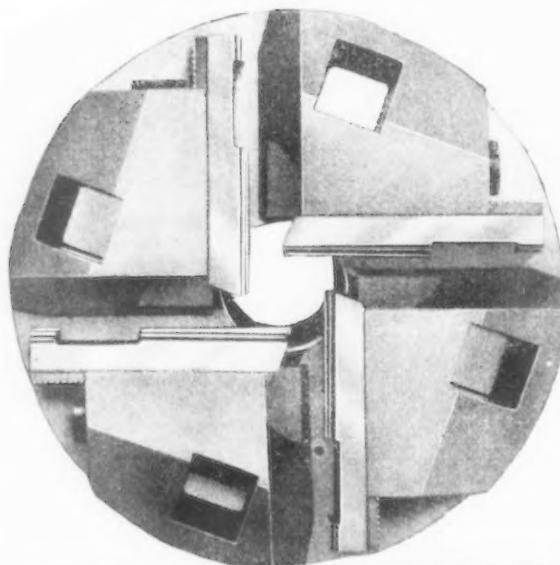
Designer Must Consider Metallurgical "Details"

The success or failure of his design may hinge upon attention to the factors which determine safe working stresses. With so many materials now available, with working stresses raised to meet the demand for lighter, stronger parts, and with cost element an important factor, the designer must know much more than tensile strength.—Page 870

Measures a Hundred-Thousandth of an Inch Speedily

Electric gage consists of a contact point whose movement is magnified 10,000 times, registering through a pointer on an indicating instrument.—Page 871

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